Class UG446
Book A9
Copyright No.

COPYRIGHT DEPOSIT.

THE WAR OF POSITIONS

BY

LT. COLONEL PAUL AZAN, LITT.D.

OF THE FRENCH ARMY

WITH A PREFACE BY

BRIGADIER GENERAL JOSEPH E. KUHN, U S.A.

TRANSLATED AT HARVARD UNIVERSITY

CAMBRIDGE
HARVARD UNIVERSITY PRESS
1917

UG446
.A9

COPYRIGHT, 1917
HARVARD UNIVERSITY PRESS

AUG 13 1917

©CLA470749

PREFACE

IT is unfortunate that authors of books are so rarely known to their readers. This is especially true of books dealing with professional matters. In such cases one would like to be assured that the author really knows his subject, and is not merely a tyro feeding his readers with self-derived knowledge.

In Lieutenant Colonel Paul Azan we have a fine type of the French officer, a representative of that noble, glorious, and chivalrous Army which has for three years challenged the admiration of the world, friend and foe alike. He has learned his subject, not only theoretically, but also practically, through long service in the trenches and at the expense of honorable wounds. It is to be regretted that all who read his book cannot know the author personally.

A War of Positions, such as is being waged to-day, has never been known before — at least not on anything approaching the present scale. It has been made possible by the mutual action and reaction of firearms and of field works, aided on both sides by the recent progress of all sorts of technical inventions.

In the exposition of his subject Lieutenant Colonel Azan has presented the fundamental principles of the war of positions in an exceptionally clear and able

manner. While written primarily for the soldier, the book is full of interest for the layman, and will enlighten the latter as to why it is so difficult to attain a military decision between antagonists fairly equal as to numbers, resourcefulness, and industrial development.

JOSEPH E. KUHN,
Brigadier General, General Staff,
President Army War College.

ARMY WAR COLLEGE,
July 24, 1917.

INTRODUCTION

THE present war, with its multitude of new forms, has come as a surprise to that school of writers who believed that they could find the secret of victory in certain immutable precepts.

They might have avoided this misconception by a study of history. There they would have learned that although the same great principles of strategy brought victory to Hannibal, to Caesar, and to Napoleon, yet tactics have undergone countless fluctuations in the course of centuries, on account of the development of armament.

The curve of tactics is ever varying, yet always continuous. Among those forces whose resultant determines its direction, two in particular have greatly increased in recent years, the destructive power of cannon, the resisting capacity of field works. A careful evaluation of the importance of these forces in the recent wars of the Transvaal, of Manchuria, and of the Balkans has made it possible to sketch this curve day by day, to note its sinuosities, and to follow its development in a new direction.

Yet all this time certain arm-chair theorists, closing their eyes to actual facts, have still remained in the domain of speculation. As a basis for their doctrines, they have taken the victories of Napoleon, or the battles

of 1870. In their wake a number of men of intelligence have been drawn by their imagination or by their enthusiasm into the realm of hypothesis and fancy, to the entire neglect of those qualities of reflection and judgment, which constitute the true value of a leader.

In the present war a similar state of affairs has been seen. How many military critics have proclaimed the impossibility of laying down general rules, on the ground that the conditions of battle were constantly changing! From time to time they have announced the passing of a new milestone in the evolution of tactics; it was merely the milestone which their intelligence had passed on its road towards reality.

Since October 1914 the tactical curve has undergone but slight modifications. The two opposing forces of artillery and field works have, perhaps, gained still further in importance, each one developing in order to overthrow the other. But the essential principles of strategy and of tactics which govern the course of the present war have really changed but little since that date, nor can they ever vary but by slow degrees.

This work, in which an attempt is made to state these principles, is written for those who have not, as yet, taken part in this war, in order to spare them a difficult and dangerous apprenticeship. Perchance it will also give food for study and reflection to those of my young comrades who are seeking day by day, at the price of untold efforts, suffering, and bloodshed, to hasten the hour of victory.

CONTENTS

PAGE

PREFACE iii
INTRODUCTION v

PART I

THE PRESENT WAR

CHAPTER I

CHARACTER AND FORMS OF WARFARE

General Characteristics 5
Different Forms of Warfare 7

CHAPTER II

COMBAT ON A FRONT

Fronts in General 12
Normal and Intensive Attrition 13
Principles of the Offensive on a Front 15
Rôle of the High Command in an Offensive 18
The Defensive 21

CHAPTER III

RÔLES AND FUNCTIONS OF THE DIFFERENT ARMS OF THE SERVICE

Infantry 23
Artillery 26
Engineers 27
Cavalry 29
Aviation Corps 31

PART II

POSITIONS

CHAPTER I

Organization of Positions

Definition of Positions and their Elements 37
Trenches 38
Plan of Organization 40
Outline of the First Line Trench 41
Interior Shape of the Trench 43
Communicating or Doubling Trenches 46
Support Trenches 48
Covering Line for Artillery 49
Boyaux 50
Shelters, Observation Posts, etc. 52

CHAPTER II

Trench Duties

Liaison 54
The Stay in the Trenches 60
Rôle of the Commanders 61
Activities of the Troops 62
Supply of the Trench 64

CHAPTER III

Relief

General Principles of Relief 67
March of a Unit from its Cantonment to the Trenches . 68
Replacing of the Unit in Line 69
Return of the Unit Relieved 74

CONTENTS

PART III

ATTACK ON A POSITION

CHAPTER I

General Remarks on Offensive Combat

Part Played by the Different Arms in the Engagement . 82
Rôle of the Command 85

CHAPTER II

Preparation of the Attack

Detailed Study of the Two Opposing Positions 88
Material Aménagement of the Departure Position . . 91
Smashing the Enemy's Position 95
Physical, Professional, and Moral Training of the Troops 100

CHAPTER III

Attack

Formations Adopted for the Attacking Units 103
Mechanism of March and of Combat 104
Struggle Inside the Position 110
Night Fighting 116
Orders, Reports, and Liaisons 118
Liaisons during the Attack 121
Liaison of the Attacking Troops with the Artillery . . 123
Forwarding of Reserves, Munitions, and Food 125
Organization of the Conquered Position 126

CHAPTER IV

Pursuit

Maintenance of Contact with the Enemy 129
Continuity of Movement beyond the Position 130
Disorder and Demoralization of Troops in Retreat and of Reserves 133
Taking the Enemy's Lines in the Rear 136
Rôle of the Command 137

CHAPTER V

March of Approach

Preparation of the Approach 141
Execution of the Approach 142
Rôle of the High Command 145

PART IV

DEFENSE OF A POSITION

CHAPTER I

General Observations on Defensive Fighting

Preliminary Remarks 151

CHAPTER II

Organization of the Defensive

Detailed Study of the Two Positions 154
Material Aménagement of the Position 155
Physical and Moral Preparation of the Troops 157
Rôle of the Command 158

CONTENTS

CHAPTER III

Defense

Maintenance of the Troops under Bombardment . . . 160
Defense of the First Line 162
Fighting in the Interior of the Position 164

CHAPTER IV

Retreat

Re-alignment of the Front 166
Retreat under Hostile Pressure 168

CHAPTER V

Retour Offensif

Objects and Methods 171

Conclusion 172

Glossary 179

PART I

THE PRESENT WAR

War, as it is waged to-day, presents a new aspect. This is not exactly the same in all countries; since the length and geographical nature of the fronts, as well as the strength and quality of the armies in Belgium, France, Italy, Serbia, and Russia are not comparable. Everywhere, however, the general characteristics of the war remain the same, since they are the result of two essential factors: the destructive power of heavy artillery and the defensive efficiency of field works.

It is a mistake to say that there are different principles of war for different fronts, or different countries. War between two adversaries, who possess sufficient forces, similar arms, and equivalent moral courage, is always dominated by the same principles, and produces the same effects. If it takes a different form, it is because one of the adversaries is notably inferior to the other. Such, for instance, is the case when an army without artillery and without munitions is opposed to one provided with all the modern engines of destruction. Under such circumstances, war assumes the aspect of the chase, and involves similar momentary risks; but there can be no doubt as to the outcome; victory is certain, and cannot be long delayed.

CHAPTER I

CHARACTER AND FORMS OF WARFARE

General Characteristics

The development of armaments has profoundly affected the conditions of combat between two armies.

The infantry of each side suffers enormous losses when it is exposed to the fire of machine guns, of field or of heavy artillery; moreover, in order to hold its ground, it is obliged to dig itself in. Furthermore, it must surround itself with accessory defenses, in order to avoid surprise by the enemy's infantry.

Consequently the assailant is held in one position. When he tries to envelop the flanks of the enemy, troops are rushed to the menaced point, stop him, and hold him in the same way in a position beside the first one.

And so the lines extend farther and farther until both ends rest simultaneously on impassable barriers, the sea or neutral countries, which are the lateral limits of the fronts.

Thus it is that, after the first encounters, a long ribbon called a trench is unrolled automatically along the front of each army. Between the two trenches is a neutral zone of variable width, at the most of some hundreds of yards.

If, in the present war, the adversaries could have foreseen from the beginning the part which " the trench " was destined to play, they would have made other preparations. Each would have built a veritable " Chinese wall," destined to guarantee the integrity of his national territory. From the

very first day, the struggle would have assumed the aspect that it has since acquired. This is exactly what happened on the Austro-Italian front.

The trench dug along the front of each of the armies does not remain in the form of a single line. The points which are most important by reason of their eventual strategic or tactical value are strongly organized; they become *centres of resistance*, made up of a redoubt, around which extend systems of trenches.

One or many centres of resistance, along with the trenches which surround or unite them, constitute *a position*.

Each position occupies a zone of very variable extent. This zone corresponds ordinarily to the task, offensive or defensive, which a large unit, army, army corps, or division, is expected to perform.

A position has both an offensive and a defensive function. It is in the shelter of its intrenchments that the attack to be carried out by a large unit is prepared: it is also by means of this organized position that an advance of the enemy can be repelled.

The *front* of an army is made up of all the positions placed side by side in an unbroken line, and resting throughout its depth on well chosen successive lines.

Behind the front, other positions are prepared and maintained, especially at points of strategic or tactical importance, in order to arrest an eventual retreat of the troops from the front line.

Combat between two opposing armies consists in attacking and defending positions. The offensive as well as the defensive may be local, multiple, or general, according to whether

it occurs in a limited zone, in several different zones, or along the entire front.

A general offensive, in the proper sense of the word, is impossible on a very widely extended front; to execute and maintain it would demand immense resources both in men and matériel. Therefore a combat characterized by a multiple offensive in a certain number of zones and by a multiple defensive in the complementary zones, along a widely extended front, is termed a general offensive.

Different Forms of Warfare

The present war may be called a *war of positions.*

It seems to resemble a war of sieges, but really differs from it in many respects; in certain special contingencies, however, it permits a real *war of sieges* to take place.

Lastly, it stamps its special characteristics upon *war of movement,* in those exceptional cases in which the latter becomes possible.

Whenever two adversaries are approximately equal in power, the war of positions is the only one possible. Admitting that the line of resistance of one of them may be temporarily pushed back on a large extent of front, and that two or even three successive lines of positions may be carried, there always remains in the rear another line of positions, under the cover of which the vanquished party may reorganize his forces; the parts of the front adjoining that which has given way accept the necessity of retirement and set themselves to work to straighten out the line. War of movement is, therefore, restricted to the space which separates the positions captured from the positions behind them.

If, on the other hand, a victorious offensive definitively cuts the enemy's line, war of movement may find wider scope. Either the beaten troops become demoralized and, if pursued with energy, throw their own reserves into disorder — thus causing a disaster which the resistance of a few fragments of the line will have great difficulty in repairing; or else the remnants of these troops, falling back on unshaken reserves, are able, with them, to rally on new positions; in this latter case each fragment individually experiences war of movements, though it tends to establish itself, for actual fighting, in a position which it either reinforces or prepares afresh.

War of movement is thus, for the time being, generally imposed by the stronger on the weaker side; in fact it logically betokens the beginning of victory. But it modifies itself more or less rapidly, according to the courage or the tenacity of the defeated troops, into a war of positions; it thus permits the equilibrium of combat to be reëstablished and a new line of resistance to be formed. Then the war of positions begins again.

There are, nevertheless, circumstances in which the war does not present the aspect of two lines of opposing positions, each endeavoring to force the other back, but in which it resumes the features of a war of movement.

These instances are as follows:

1. When one of the armies is insufficiently supplied either with men or matériel, to cover the fronts which it must hold;

2. When one of the armies, having its front well supplied, lacks sufficient reserves either in men or in matériel, to go to the rescue in case a breach is made. This might occur when a

belligerent, enfeebled by the wastage of the war, did not soon enough accept the necessity of shortening his front.

3. When the armies facing each other have to manoeuver over a large space in comparison with the amount of their effectives — as in East Africa or Equatorial Africa, in Mesopotamia, etc.

In these different instances, the troops are no longer held in by a continuous barrier which prevents manoeuvering. And yet, when they come into contact, they all consolidate their positions by digging trenches, by providing them with accessory defenses, by utilizing their artillery to the best possible advantage. Thus the actual combat, which follows these preparations, takes on the same character as the war of positions.

Movement, when it becomes possible, is limited, furthermore, by a reason other than the encountering of organized positions; this is the difficulty of transporting an adequate supply of matériel and of provisions.

Bold and rapid manoeuvers, such as used to be carried out, have become very difficult. Napoleon could say that he "made war by the legs of his soldiers," because his success came through bringing up his infantry by forced marches, in order that, at the critical moment, they should intervene on the battle field.

To-day, it is the heavy artillery which must be moved in order to win. For this, railroads are necessary, or at least excellent roads that will support immense burdens. As the defeated army is certain to destroy, or at least to injure, its lines of communication in its retreat, it becomes necessary to repair them. The preparation of gun-emplacements, and of

ammunition depôts, demands much labor; for the heaviest guns it is even necessary to construct platforms. The installation of telephones between the observing stations, the guns, and the commanders is a long affair. The artillery fire must be adjusted on new targets. All these preparations take time. Lastly, this artillery will be of very little use in the battle if it is not furnished with an enormous amount of ammunition, capable of being supplied without interruption; this one great need, with which are connected so many others relative to the supplying of the troops, makes essential a system of communications in which railroads, coming as close as possible to the front line, are necessary.

Rapidity and range of movement in the present war are, consequently, proportional to the mobility of the heavy artillery.

The most important feature of moving from one position to another no longer consists in the approach of the infantry and of the field artillery, but rather in the transportation and in the setting up of the heavy artillery. Movement is made easier if it be possible to keep in hand a supply of heavy matériel loaded on wheels or tractors, ready to follow instantly in the wake of victorious troops.

Detachments of all arms excepting heavy artillery, but including field pieces, motor-carried guns, and armored cars, may have important results in a pursuit; they may also promote success by effecting a surprise or by making a diversion. But they cannot assault a strongly organized position defended by seasoned troops.

To gain victory, it is essential to have heavy artillery in as large quantities as possible, furnished with up-to-date means of transport, and supplied with abundant ammunition.

This heavy artillery must be of the rapid-fire type, since in the same length of time a rapid-fire gun will throw as many projectiles as several slow-firing ones, since it can be much more easily moved and installed in a new position, and since it demands fewer men to handle it.

The considerable breadth of the zone in which an attack must be carried out, from one position to another, demands immense expenditure of ammunition, and causes rapid deterioration of the guns. Only intensive manufacture can keep up with this prodigious consumption of cannon and shells.

Thus the present war is, from many points of view, a war of matériel.

CHAPTER II

COMBAT ON A FRONT

Fronts in General

A front is, from the strategic point of view, an unbroken line of positions, limited in length by an insurmountable obstacle at each end.

A front is generally subdivided into a series of zones, each of which, by an extension of meaning, is called a front. This occurs particularly when several allied nations share the same front; in such cases one speaks, according to the nationality of the troops engaged, of the Belgian front, the English front, the French front.

Whatever may be the number of fronts held by a single nation or by several allied nations, one essential principle must dominate in the conflict: the perfect coördination of efforts.

For a nation, acting independently, this coördination is ensured by the Commander-in-Chief. For a group of allied nations, it is secured by a single body, a sort of Superior Council, whose orders are executed by the Commanders-in-Chief on each front.

The judicious distribution of human effectives or of material reserves, the opportunities of bringing them into action, the intensifying or easing up of attacks on this or that front are thus regulated by a supreme authority whose sole aim is to win.

Victory is obtained by the destruction of the armies of the enemy. On every front, therefore, this is the result which must be attained.

Normal and Intensive Attrition

Combat on a front is the sum total of the daily engagements which occur there, both offensive and defensive.

Its aim is the destruction of the enemy's army.

This army is protected by a trench, a long barrier bristling with positions. It has at command reserves which are distributed behind the principal zones, ready to move toward any threatened point.

The endeavor is to compass the destruction of this army by attrition.

Attrition is the loss in men and in matériel imposed upon the adversary during a definite period.

Attrition in men is irreparable. Even supposing that a higher birth rate may more than compensate the losses of a nation, this increase will be of no advantage to the armies for twenty years. Attrition in men is estimated by adding together the killed and the permanently disabled. Its real importance is determined at any given period by comparing two numbers: the total number of men who were subject to mobilization at the beginning of the war or have become so since, and the total number of the killed and unfit.

Attrition in matériel may be repaired by increased activity in the factories. Thus its real importance is estimated by the difference between production and consumption; it depends, furthermore, on the difference between the stock of raw material and the demands of manufacture. If either one of these differences diminishes to the vanishing point every

increased demand for consumption and every accidental delay in production may mean disaster.

Attrition is the more dangerous for a nation, all of whose fronts are being engaged, in that it possesses the less reserves. There comes a moment in fact when the dearth of effectives is reflected not only in the number of troops at the front, but also in the number of workers in the factories. Then it becomes necessary either to shorten the front, or to diminish industrial production.

Attrition, on the contrary, is less dangerous for a nation which has a considerable reservoir of human reserves.

In any event, it is always necessary to keep a close watch on attrition in matériel, since the number of cannon adequately furnished with munitions is often more important than the number of battalions in the line. Hitherto, it was the infantry of the two opposing sides that came into collision; the victory went to that one which at the last moment could avail itself of further reserves to throw in against the troops already exhausted by the combat. But to-day the effect of artillery on the earthworks and guns of the enemy is the decisive factor in success; victory goes to that army which has guns in good condition and abundant munitions, as against an enemy whose supplies have given out. The flinging of innumerable infantrymen against batteries that are still intact results in nothing but useless slaughter.

Normal attrition occurs in zones which are stationary, in other words, in trench warfare. It cannot lead to any decisive result. On the other hand its effectiveness must never be lost sight of, and is frequently pointed out to the troops engaged, because it stimulates their morale and their activity during those periods when operations have slowed down.

Intensive attrition occurs either through offensive operations which are conducted for the purpose of seeking out the enemy in his entrenchments, and which cost him heavy losses in men and in matériel, either through capture or destruction; or by defensive actions which prohibit the enemy from access to occupied positions.

It is the methodical offensive of the infantry, prepared and accompanied by a powerful artillery fire, which at a given moment causes a break in the balance of power between the two armies by reason of intensive attrition throughout a large zone.

Principles of the Offensive on a Front

The offensive on a given front is always general, in the sense that all zones are constantly preparing for conflict, and are continually studying the methods of conducting a successful advance.

Attacks are actually set in motion, however, only in a few zones, since it would demand unlimited reserves both in men and in matériel to sustain them over the entire front.

The principle of economy of forces in a general offensive, therefore, makes it advisable not to attack in certain zones. In particular, it is wiser to rest on the defensive when opposite positions the taking of which would have no important tactical results, or which would necessitate sacrifices disproportionate to possible gains.

The zones of attack are determined by the Commander-in Chief. They are always considerable in extent, from fifteen to twenty miles or more, and ordinarily correspond to the strength of an army. Attacks executed on a narrower front

force the troops into a salient, and thus expose them to considerable losses without obtaining any result.

The zones of attack are the object of thorough preliminary study, which bears on the organization of the terrain, as well as on the configuration and the defense of the enemy positions. This study takes into account the measure of completeness reached by the preparations for the offensive in all zones. The troops in the trenches should devote themselves unremittingly to these preparations.

Each zone, whether or not it be in the plan of attack, has at call its own reserves. General reserves, in as large numbers as possible, are at the disposal of the Commander-in-Chief.

Different attacks are not necessarily simultaneous; if they occur in succession it tends to disconcert the enemy.

One of them is ordinarily considered the principal attack. It has as its object the capture of one or of many successive positions. It aims to enlarge the breach already made, and to bring about the fall of the positions on either side of it.

Secondary attacks are as far as possible made at other points. Their purpose is not only to make the enemy uncertain as to the direction of the principal attack and to hold in place the reserves of the different zones, but also to disorganize and break the enemy's lines and to cause him to move back.

Every attack ought to be conducted with extreme vigor, until its predetermined object is entirely accomplished. The chief officer charged with executing it should assure himself beforehand that he has at his disposal the means necessary to carry it through. It is not for him to ask whether his is the

principal or secondary attack, but merely to take to heart the idea that his success may give the victory to his country.

Luck plays a great part in battles. An attack considered at the beginning as secondary may become the principal one, if its crushing success in the zone where it occurs brings about unhoped for results.

Thus, every partial attack, having no other aim than that of "making a demonstration" ought to be avoided. It can result in nothing useful. Even the capture of a few trenches does not deceive the enemy, and often costs the troops engaged heavier losses than an attack of great magnitude.

Two conditions are essential to the success of an offensive: secrecy of preparation and rapidity of execution.

Secrecy is obtained by the disciplined discretion of the troops and of the civil population; by the constant carrying on of work of the same character along the whole front; by the ceaseless watchfulness of the aviators, which prohibits reconnaissance by the enemy's aviators.

Rapidity is ensured by the habits of order and discipline of the troops; by knowledge of and obedience to the rules relating to the occupation of positions; by the foresight of the generals and their staffs during their preliminary studies and the period of preparation.

A successful attack makes a breach in the front line of the enemy, a breach which becomes deeper and wider each day through the fall of lateral and successive positions.

The result is that other parts of the front, in danger of being attacked from the rear, are obliged to fall back in order to straighten the line.

This is the movement for which all the troops in line are watching. Through incessant activity they try to keep the enemy fixed where he is; they thus prohibit him from retiring his artillery and clearing the men from his trenches; they inform themselves concerning his situation and his intentions by every possible means, especially at night.

On learning of the expected retreat they follow up the enemy's troops closely, harass them in every possible way, and pursue them without respite. Not only do they thus secure a large section of territory, of which the possession may be useful; but above all they bring about the capture or destruction of men and matériel in large quantities, which is a sure token of victory.

Rôle of the High Command in an Offensive

The Commander-in-Chief chooses the zones of attack, determines the effectives which he will devote to each of them, and fixes the day on which the attack shall take place.

He confides his purpose to each of the army commanders whose business it is to direct an attack. He indicates to each of them the zone which is to be his, the task entrusted to him, the effectives and material resources at his command, and the ultimate aim for him to attain.

Each army commander acting on these data attends to the distribution of his army corps and to the drawing up of the reserves at his disposal; he indicates to every commander of an army corps his zone of attack, the part he is to play and his successive objectives; he gives all the orders necessary for the reconnaissance of the enemy's positions, the preparation of the terrain, the organization of supplies.

Every army corps commander gives orders relative to the preparation and execution of the attack within the limits of his own zone and his own particular mission.

When the date agreed on for the attack is near, the Commander-in-Chief, who has been kept constantly informed as to the state of preparation for the different attacks, makes certain that this preparation is absolutely complete. He launches the attacks at the moment which seems to him opportune, either simultaneously or in succession.

During every attack, exactitude and continuity of information from the top to the bottom of the official ladder are one of the essential conditions of success.

The army commander continually reports to the Commander-in-Chief the objectives reached, subsequent possibilities, and difficulties encountered. For this it is necessary that he himself should be accurately informed. It is moreover essential that he should have precise information, in order to be able to play his personal part, limited though it be, in the action which he has prepared, since he has to send in his reserves at the right moment if the attack appears to be approaching success, and must not waste them uselessly if the attack has encountered insurmountable difficulties.

It is the army commanders, who, by their reports, furnish the Commander-in-Chief with the means of making a decision; for, in the equation to be solved, they substitute concrete numbers for algebraic symbols. Whatever may be the accuracy of the data which the General may have collected beforehand as to the objective of the attack, he cannot foretell the enemy's capacity of resistance, because this depends on factors impossible to estimate — the destructive effect of the attacking

artillery, the quality of the enemy's Command, the tenacity of his troops in defense, etc. — factors which are completely revealed only during the course of the attack.

Only the Commander-in-Chief who is informed as to the collective result of the attacks has sufficient knowledge to continue them, to develop them, or to stop them.

When he has discovered the zone in which it is to his interest to continue his efforts, he directs his general reserves thither and diminishes gradually those attacks which have become secondary. At need he even draws upon the reserves of other zones in order to turn the scale of victory.

The rapid transport of troops to the theatre of the principal attack is assured by railroads, of which the entire system has been steadily improved and completed in view of the possibility of such eventuality; by motor transport, which can be utilized up to the immediate neighborhood of the front.

Thus the Commander-in-Chief distributes his reserves of men and matériel with a full knowledge of actual conditions, in order to accomplish the end which he has constantly before him — the destruction of the hostile army. The attainment of predetermined objectives and the taking of powerful positions are simply the means destined to bring him nearer to this aim.

Every army commander acts according to the same principle in his own zone of attack. If his task is completely accomplished, new horizons may suddenly open before him. He has his own reserves at his disposal, and is thus enabled to keep his troops going and the front line supplied, while he is waiting for the decision of the Commander-in-Chief.

Although the idea of destroying the enemy remains the supreme rule of war, it must never be the guiding star of an

army corps or of an inferior unit; for if it were, there would in certain instances be grave danger of such units being drawn on toward positions where the High Command would have neither the wish nor the means to support them. Their initiative and dash find proper expression only within the limits of the tasks confided to them. When their leaders see larger possibilities, they report immediately to their superior officers; the army commanders report to the Commander-in-Chief, and while waiting for his decision, give such preliminary orders as the situation demands, in order to enable them to follow up the success without delay. An attack should never be set in motion unless the means of putting it through have been prepared.

The Defensive

To rest on the defensive cannot lead to any decisive result.

The losses which it causes do not prevent the enemy from concentrating his forces for attack whenever and wherever he wishes; its effects can in no case suffice to bring the enemy to terms.

A local defensive may be determined on for certain zones, to be maintained during the period of a general offensive; but it is subject to rules which prohibit it from being passive; these rules will be studied later in the section entitled *Defense of a Position.*

A general defensive may be considered as a possibility, when the enemy has taken the initiative in operations along the whole front, but even then, passivity is no more excusable than in a local defensive.

The rôle of the High Command in such a case is analogous to that which it plays in an offensive.

The Commander-in-Chief, fully informed by frequent and precise reports as to the progress of the different attacks which he must meet, discovers the principal one; at an opportune moment he proceeds to the redistribution of his reserves and of his matériel. His presence of mind, decision, and judgment should enable him to avoid a haste which might be irreparable or a delay which might be fatal.

It is his duty to choose the moment when the enemy is repairing his losses or has made a blunder to launch a counter attack of great dimensions.

If he has kept in hand sufficient reserves he may even pass to the counter-offensive, and win a victory that could not have been gained by a direct offensive against an adversary demoralized by the failure of his attempts and the losses of his troops.

Army commanders conform to the same principles within the limits of their zones of attack and the orders that have been given them. They, in particular, have it in their power to arrest the attack of the enemy and to regain the advantage by means of opportune counter attacks.

As to army corps and lesser units, it is their absolute duty, except in case of formal orders to the contrary from the High Command, to hold the positions confided to their charge, cost what it may.

A wise and vigorous defensive may prepare the way, through the losses imposed by it on the adversary, for an ultimate offensive which will break the enemy's front and, in consequence, bring victory.

CHAPTER III

RÔLES AND FUNCTIONS OF THE DIFFERENT ARMS OF THE SERVICE

Infantry

Infantry is powerless without the aid of artillery, which shares with it the principal rôle in combat. But its task is the finest and the most heroic; since, in spite of the curtain of fire with which the artillery tries to protect it, the infantry is obliged deliberately to expose itself to danger and to pour out its blood generously in order to win success.

It acts by movement and by fire. During an attack on a position, its movement assumes the character of successive assaults, since its object is to carry lines situated at short distances from each other. As a result of the protection given to the enemy by his trenches, the bayonet no longer plays as important a part in these assaults as formerly; it is superseded or replaced by the grenade, the revolver, and the knife.

Its movement assumes the aspect of a march of approach when it occurs between two positions more or less widely separated from each other.

By the use of appropriate formations the infantry can pass through artillery barrages or diminish the effects of machine-gun and rifle fire. From the time it enters the zone of combat it ought absolutely to avoid close order formations such as columns of four.

On the defensive, movement consists in counter attacks which, launched at an opportune moment, may have a decisive effect; and in *retours offensifs* in case the lines have been carried.

Infantry fire is the work of the rifle, the machine gun, the French automatic rifle, the revolver, the rifle grenade, and the hand grenade — and those artillery pieces called infantry cannon, trench mortars, etc.

On the offensive, fire plays a less important part than formerly. It is begun with rifle and machine gun, when an advance cannot otherwise be made. Under these circumstances it becomes a means of progression for the whole fighting line, as well as a moral support for the skirmisher who has been obliged to stop; but its employment, when it becomes general on an attacking front, indicates either serious difficulties or betokens a repulse.

Rifle grenades, French automatic rifles, as well as machine guns boldly placed and cleverly managed, throw the enemy into disorder, oblige him to dig in, and cause losses. These weapons make it possible to keep up the advance little by little. On the approach to the trenches which are being attacked, and during the course of the struggle which develops around them, French automatic rifles, hand grenades, and revolvers take their toll from the enemy's infantry. Portable pieces, such as the 37 mill. (1.5-inch) guns, bring success against machine guns and defenses which remain in being. These pieces, furthermore, render important service in continuing the advance.

On the defensive, fire retains all its effectiveness. A line of infantry under shelter, which keeps its presence of mind, has

a good chance of stopping the enemy by means of its machine guns, its rifles and its grenades. Even if it has been shaken by the fire of the enemy's artillery, even if its trenches and its accessory defenses have been smashed in, it can lay low its assailants before it comes to a hand to hand conflict, and with the bayonet dispose of the demoralized survivors.

Machine guns, employed with the same audacity as on the offensive, play a considerable part, especially by flanking fire and enfilade. French automatic rifles, kept under cover during the bombardment, are set up at an opportune moment; they demand, for transportation and service, a less numerous personnel than machine guns; handled by experienced and resolute marksmen, they have great effect. Indeed, if these weapons are skilfully utilized on the defensive, it is often possible to hold the first line with a smaller number of troops. Trench artillery, which is not intended to accompany an advance, but only to prepare the way for it by its effect on the enemy's trenches, may be more powerful than pieces which are taken forward with the infantry; it is, however, sometimes put out of action by the enemy's preparatory bombardment, and cannot be speedily replaced.

To sum up: infantry can make no attempt against a position unless the artillery has destroyed the accessory defenses, smashed the trenches and demoralized their occupants. To succeed, furthermore, it must needs advance with prudence and method, with the constant support of its artillery, and display to the full its courage and its energy.

On the other hand, infantry sheltered by its trenches, which clings to the terrain with the determination to hold it at whatever cost, may inflict enormous losses on the assailant and stop his advance.

Artillery

Artillery plays a preponderant part in combat. On the offensive it thoroughly prepares the attack; it protects the infantry during the action and facilitates its advance. Finally it is moved forward if the position is captured, in order to make the pursuit easier and to prepare if necessary the attack on the next position.

On the defensive, it fires on the concentrations and on the changes of position of the enemy's troops as these are reported. It delivers barrages when the infantry calls for them. At the order of the commander it effects concentrations of fire, which, on account of the great range of the pieces, can be accomplished without moving them; these concentrations are directed upon those points where it is desirable to subject the enemy to the severest kind of pounding. Lastly, it can assign to batteries and isolated pieces the task of catching the ranks of the assailants as much as possible by flanking fire or enfilade; these pieces fire until the last moment, sacrificing themselves, if need be, for the infantry.

Heavy artillery acts through destructive fire on well-defined objectives and on strictly limited zones; on it devolves the duty of putting out of action or at least of neutralizing the enemy's artillery; it alone is able to smash organized defensive positions which have been long established and constantly improved.

Field artillery has the task of destroying accessory defenses or lightly built shelters, and of firing on the enemy's troops. Its mobility permits it to take part in the forward movement of the infantry, to continue its indispensable support, and to play a rôle in pursuit.

Trench mortars are used in the preparation of an attack and may even smash, quite unaided, the enemy's first line. During the combat the lightest of them may constitute a sort of "infantry artillery," advancing in the wake, and at the disposal, of the infantry units. Tanks are automatically moving pieces, capable of traversing every kind of ground; they accompany or precede the infantry, in order to facilitate the accomplishment of its task.

The first essential to make it possible for the artillery to fire to good advantage is that it should be able to see. The choice of permanent observing stations for the artillery should be primarily determined by this consideration, and is of great importance. Indications furnished by the infantry, either during its stay in the trenches or during the course of its advance, are collected by special observers attached to it, and in constant communication with the batteries by telephone or other means. Lastly, in many instances, the aviators are alone able to furnish precise information concerning the objectives to be fired at and the adjustment of the guns; if provided with accurate observers they are invaluable collaborators for the artillery; captive balloons are of great service to the heavy artillery.

Waste of ammunition is a fault which cannot be too severely reprehended. A large expenditure is necessary when favorable opportunities present themselves, with the certainty of attaining useful results; for that very reason a wise economy is the more indispensable when there is no definite target to fire at.

Engineers

The engineers are the constant and indispensable auxiliary of the infantry. Their rôle consists in organizing positions,

together with the infantry, in establishing and improving communications, and in executing or directing all sapping and mining operations.

The war of positions has greatly developed the duties of the engineers, so much so, in fact, as to render them very onerous. They often have to be reserved for urgent or delicate operations, while for the less important jobs a few non-commissioned officers and sappers direct, aid, and advise workmen from the infantry.

On the offensive, the engineers have the duty of preparing the ways of access to the enemy, such as saps, and breaches for sorties in the accessory defenses. They do not have to open passages in the enemy's defenses, for this job devolves on the artillery, but only to improve them, whenever circumstances permit. If possible, they connect the saps through which the troops emerge from their trenches with the first of the enemy's trenches which are taken.

They follow the first waves into the trenches, in order to clean the latter out, to repair them, and if need be, to reverse them.

If the position is taken, the engineers consolidate it rapidly with the aid of the infantry, provide it with accessory defenses and accumulate obstacles which can be used to oppose a counter-attack: not till later do they undertake a methodical and complete organization of the position.

In case of a pursuit, they see to it that the places which can be utilized for the passage of automobiles, artillery, cavalry, and cyclists are completely cleared, and constantly maintained in good condition.

On the defensive, the engineers take part in the consolidation of the position according to orders given by the commanding officer; they install and repair accessory defenses and construct all sorts of works intended to augment the resisting power of the trench, and the security of its occupants.

The engineers have special charge of mining operations. They do not engage in them however except as a means to an end — such as the possession of an important post of observation, or the occupation of a flanking salient; for the smashing of a trench has no great intrinsic importance. They are sometimes obliged to do this, however, in order to oppose mining activities by the enemy; in such cases they limit their operations to those which are indispensable for purposes of protection.

Cavalry

Cavalry plays a restricted part in the war of positions; it can only be utilized in pursuit when the offensive succeeds. On the other hand, it resumes its full activity in a war of movement.

When a position has been taken, the cavalry, which up to this time has been kept in the rear, is brought forward by ways previously reconnoitered, and crosses the trenches by specially prepared bridges. Its officers must have familiarized themselves, by actual inspection and by means of maps, with the terrain on which they are going to send their troops into action; they receive from the High Command information concerning the enemy, collected ever since the beginning of the engagement, and indications of the services they may be able to render, but they retain a large measure of initiative.

From that time on, the cavalry has for its essential function the acceleration and completion of the rout of the enemy; for this purpose it operates by movement and by fire. It attempts to overtake the artillery units in position or in retreat; and, if it cannot catch up with them, to destroy them by its fire. It separates from their units delayed groups of infantry and stragglers, throws the reserves into confusion, causing heavy losses, and surprises transports and convoys. It spreads out behind the enemy's front, thus threatening from the rear the troops still in line; it breaks telegraph and telephone lines, cuts railways, occupies or keeps watch on centres of communication. It sends back frequent items of information to the commanding officer.

This task presents very great difficulties. The crossing of the zone of hostile trenches can only be accomplished along routes reconnoitered either by the infantry or by cavalrymen sent on in advance. However great their bravery and their skill, the latter cannot ride across ground furrowed in all directions by trenches and boyaux, pitted with shell craters, and worst of all, strewn at every step with barbed wire. Even supposing that none of the hostile groups which usually hold out here and there can fire on them, they are soon dismounted by falls and injuries to their horses. Lastly, a single machine gun or a single piece of artillery may take frightful and almost immediate toll of them.

Therefore cavalry must generally follow the roads in order to cross the zone of the hostile trenches; but if batteries succeed in getting them under fire — and this is easy on account of their limited speed — they are likely to be almost completely destroyed.

Granted that it succeeds in surmounting these obstacles unchecked, the cavalry may, in the course of pursuit, encounter a second position, and be exposed to the fire of the defending artillery. Only in case of deficient organization of this position, or of complete demoralization of the enemy, does it have the opportunity of effecting a surprise: and yet this chance should always be taken, for if success ensues, it will bring victory.

Aviation Corps

The aviation corps fulfills the functions of scouting, of observation, and of combat. It constitutes a permanent auxiliary to the High Command, and an indispensable adjunct of the artillery.

It includes airplanes of different types, observation balloons, and dirigibles.

The essential task of airplanes is to reconnoiter the enemy's positions; they make out the plan of his trenches, determine the location of field works and that of batteries; they achieve excellent results in observation by means of photography. They should also, in their daily expeditions, keep watch over the movements of the enemy on roads or on railroads, over changes of appearance in his shelters, over the works he has undertaken, and concentrations of his troops. All information furnished by these reconnaissances is sent as soon as possible to the High Command.

Airplanes are the actual posts of observation for the artillery, when observers on the ground have an inadequate view; they adjust the fire of the batteries by means of signals or by wireless messages; they attempt at all times to discover and indicate hostile batteries not previously located. Artillery officers

should make themselves familiar with the science of aërial observation.

During a battle, airplanes are both means of reconnaissance and of coördination. They must keep an eye on the movements of the enemy, on concentrations for counter-attacks, on forward movements of the reserves, and on the directions in which the defeated troops retreat. At the same time they keep in sight of the attacking troops: they signal to the commander and to the artillery the position of the first line of infantry, and receive and transmit the latter's requests.

Airplanes are also weapons of offense and defense.

Their usual function on the offensive is to go over the enemy's territory in order to drop bombs on important tactical points: — railway stations, factories, camps, depôts, barracks of reserves, points of concentration, centres of communication. Airplanes designated for bombardment are accompanied by swifter craft armed with machine guns or pom-poms, whose duty it is to protect them against possible attack.

During a battle, they can play a valuable part by using their bombs, their cannon, and their machine guns against troops on the march and even against small defensive positions.

The defensive function of airplanes is to establish barrages along the approaches to the front line. Battleplanes strive to prevent the observations and the attacks of hostile planes by launching themselves in pursuit of them and driving them down. Certain planes are specially used against observation balloons or dirigibles; they are armed with specialized implements for the burning or destruction of these machines. The enemy is thus hampered in the acquisition of information,

the adjustment of his fire, and in making trouble behind the lines.

Observation balloons have the function of keeping watch over a definite area of the enemy's positions and of furnishing the Command with the information they have acquired. They are the constant auxiliaries of the heavy artillery, with which they are connected by telephone; the observers, carrying field glasses of long range and high magnifying power, indicate the target and control the fire. These balloons, placed at a sufficient distance from the enemy's lines to be comparatively invulnerable to his artillery, are defended against aërial attack by battleplanes and anti-aircraft batteries.

Dirigibles are used for fighting. As their vulnerability by artillery fire prevents them from venturing over the enemy's territory by daylight, they are useless for reconnoitering. Their offensive rôle is limited to the bombardment of positions of military importance, and their defensive rôle to opposing raids by hostile dirigibles. They are used in the defense of the seacoast, as in naval warfare, in order to indicate the movements of the enemy's vessels and to reveal the presence of submarines.

PART II

POSITIONS

CHAPTER I

ORGANIZATION OF POSITIONS

Definition of Positions and their Elements

A position generally coincides with a geographical entity. It is designated by a name borrowed from the geography of the locality, such as that of a village (*Langemarck*), of a mountain (*Le Mort-Homme*), or by a name created for the occasion (*the Labyrinth*).

It comprises one of several *centres of resistance.*

A centre of resistance is a tactical element composed of one or of several supporting points, such as villages, woods, heights, and surrounding field works.

Positions and centres of resistance correspond to the natural topographical elements of the Front.

In order to facilitate the distribution of the troops and the operation of the service, a position is generally subdivided into *sectors* or *sub-sectors* which are given geographical or numerical designations.

These sectors and sub-sectors in turn include trenches, which are given geographical or numerical designations, or are named for brave men who have been killed in action.

Positions are of variable importance. The measure of this depends on their strategical or tactical value, on their topography, on the value and configuration of the hostile positions opposite them, on the number and activity of the enemy's

troops, etc. The size of their garrisons depends solely on the measure of this importance, and not on their extent.

Each sector and sub-sector corresponds to the extent of terrain which can be held by a unit of infantry — such as a brigade or a regiment. The density with which the unit must be distributed depends on the nature of the terrain, on its tactical importance, etc. Sectors and sub-sectors, therefore, have fixed garrisons, but variable areas. One of them may, consequently, either become identical with a centre of resistance, or constitute a subdivision of it.

Trenches

The word "trench," as commonly employed, is used to designate, singly or as a whole, the elements which compose the front.

The trench, in its original or specific meaning, is the shelter which is dug in the ground by the first line skirmishers: it enables them to protect themselves from being hit or seen by the foe, and to get into touch with one another. It marks, on the terrain, the limit of the infantry's efforts during the combat; it traces the line which this infantry has been unable to pass in its advance, or that on which it has stopped in its retreat.

The trenches, in the most general sense in which they are spoken of by the troops, are the ensemble of the field works established by the infantry in any given position, to afford them shelter and a means of going about in proximity to the enemy. This ensemble contains trenches in the more specific sense, boyaux, shelters, observation posts, and depôts.

The organization of villages, of woods, and of other supporting points is effected according to the same principles as

in previous wars. It comprises, however, a more complete utilization of underground work, and a more liberal equipment of the edges and the interior with machine guns. Whenever possible, it is essential that the details of this organization be concealed from the enemy's airplanes. The supporting point, which is often more easily visible than its surroundings, should be made as far as possible to blend with the adjacent territory, on pain of being singled out for the heavy fire of the enemy's artillery.

The study of a position, therefore, brings us back to that of the elements of which a trench or trenches are composed, when the ribbon-like ditch made by the first diggings of the skirmishers has progressively ramified itself for purposes of communication and of defense.

First line trenches are connected with the rear by *boyaux* running perpendicular to them. Communicating and support trenches are dug in a direction in general parallel to those of the first line, in order to support them or to provide additional space. A line of redoubts and trenches, called a *covering line for artillery*, is used to afford the cannon a greater measure of security in case of an enemy attack. *Shelters* are places dug in the ground, either separately or collectively, to protect the troops, their arms, and their machine guns against projectiles or bad weather. Observing stations are topographical points, so situated as to be available for looking out in front, and so organized as to permit observation of the enemy, without being observed by him or exposed to danger. *Depôts* are shelters in which to keep munitions, grenades, matériel, water, and provisions, all of which may be immediately needed in case of battle. *Emplacements for batteries* are

used to install the pieces of different calibres at points suitably chosen from a technical point of view. They are provided with shelters and accessories, necessary for the proper service of the pieces, and the security of the gunners.

Plan of Organization

The general organization of a position is carried out in accordance with a complete plan, elaborated by the commander of the unit which occupies it.

This plan contemplates, from the first, both the defense of the position captured, and the attack of the opposing position, and is for this reason divided into two parts; for works should usually be constructed with the double object of progressing further, and of retaining the conquered terrain.

This plan is drawn up as soon as possible after the troops have been installed in the position, in order to avoid mistakes, discussions, and indecision. It takes into account the provisional work carried out on the orders of the commanders of sectors and of sub-sectors, in order to meet first needs. But, as soon as it has been settled, it is obligatory on every one to conform to it absolutely.

In order that the organization of a position may be methodical and homogeneous, it must be carried out not only with a view to the needs of the position as a whole, but also with a view to its continuance by subsequent occupants. Thus, in case of a relief, the plan of organization is faithfully transmitted to the new unit, and scrupulously followed out: it can only be modified on the order of the new commander of the position.

No trench ought to be considered as provisional, and destined to be abandoned in consequence of a forward movement. This conception, though it contains a measure of truth, is prejudicial to the security, comfort, and discipline of the troops. It often results in an inadequate defense, a makeshift installation, and in habits of carelessness and idleness.

The outline of the first line trench depends, at the outset, solely on the hazards and difficulties of the actual combat, and does not always correspond to a tactical idea.

Thus the initial outline of the trench may be modified as a whole, or in detail, in accordance with a thorough examination of the position. Such a modification, when carried out at leisure, in relative security, saves the defenders many mistakes; otherwise they may be obliged to effect it under pressure from the enemy and in the midst of the gravest dangers. The hypothesis of a hostile attack, with all its consequences, ought to guide the commander of a position in reaching his decision, quite as much as the prospect of the resumption of the advance.

There will seldom be any modification of the original outline if the commander of a position decides to be guided by advice asked of subordinates. Either through vainglory or simple inertia, the commanders of small units — such as companies or battalions — often prefer to retain a defective line, rather than to abandon to the enemy a few hundred yards. Furthermore, in a consultation of this kind, neighboring sectors and sub-sectors, as well as units in actual occupation and relief units, would have to be brought to agreement — which is impossible, save by the maintenance of the status quo. And yet, sometimes a slight change will save losses which might ultimately prove very costly.

The final outline of the first line trench is determined, in principle, by the commander of the sector. It is approved by the commander of the position, who limits himself to such modifications as are necessitated either by the tactical situation of the position, or by the need of good communication between the sectors. It constitutes the first element of the plan of organization.

The outline of a trench is very difficult to decide upon at first sight, if account be taken of all the conditions, at times contradictory, which it must fulfil, and if due regard be had to the conformation of the terrain, to the situation and intentions of the enemy, to the security and well-being of the soldiers. Thus it is knowledge of the ground, aided by good judgment and keen observation, which leads to the adoption of the best measures.

This reasoned outline is often found to coincide with that one which has been instinctively traced on the ground by the infantrymen when seeking to escape from artillery fire, to conceal themselves from the sight of the opposing infantry, to obtain a sufficient field of fire, etc. Often, also, this outline is very different from the one which would have been selected as a result of unintelligent application of theory.

The trench must be continuous. It may, however, include zones less strongly held than others, at points where material obstacles offer a sufficient barrier to the enemy's efforts: yet care must be taken lest these obstacles disappear in fine weather (as might be the case with certain swamps) and to see that they are constantly swept by the fire of the neighboring trenches. Trenches which are thus lightly held are little more than means of communication, but they have the

advantage of causing the enemy's aviators to believe that there is no discontinuity in the line.

Inactive zones without trenches, solely defended by artificial obstacles such as barbed wire entanglements, and by the oblique fire of cannon and machine guns, present risks which are so great that they should as far as possible be avoided. They permit the enemy's fire to be concentrated on more limited spaces, in which the troops suffer more losses; they prevent direct liaison between neighboring units, thus impeding their mutual support and the concentration of their efforts; they expose the first line to the danger of being pierced in case the enemy succeeds in destroying the artificial defenses or in neutralizing the artillery fire; they render more difficult the intervention of reinforcements in zones which have not been provided with shelter. These different defects outweigh advantages such as economy of forces and lightening of the service.

The interior shape of the trench depends primarily on the nature of the soil.

Generally speaking, a trench is so arranged as to permit the men in it to stand erect when firing, and has a parapet composed of the soil thrown up in the process of construction. In this parapet loopholes are arranged for firing and observation, and there is a step for those who use them to stand on.

Trenches do not run in straight lines: they are interrupted every five or six yards by traverses. These traverses, dug in the natural soil, are about two yards thick, and protect each compartment of the trench from projectiles exploding in the neighboring ones: they also prevent the enemy, in case he penetrates into one compartment, from enfilading the whole trench with his machine guns and his rifles.

First line trenches contain special emplacements and shelters for machine guns. The emplacements, carefully chosen, are distributed along the trench, in such fashion as to bear to the best possible effect on the important points of the enemy's line, and also on the whole space between the two lines. A machine gun should operate on the flanks, that is to say, it should attempt to enfilade the lines of possible assailants. Each machine gun has a clearly marked sector of fire. The shelters are placed close at hand; they serve to protect the machine guns and those who serve them, when they are not firing.

The location of emplacements and shelters of machine guns should not be apparent from the exterior shape of the trench; otherwise they are destined to be speedily destroyed by the enemy's artillery. Sometimes the shelter is put on the very line of the trench: the machine gun and gunners installed there are given an opportunity to fire through a loophole which is plugged with a sand-bag, and opened only at night or in case of an attack. The difficulty with this system is that it exposes the machine gun to the danger of being buried in the earth, and put out of action, in case its shelter is directly hit during a bombardment. Thus it is usually a better plan, despite the loss of time which results, to place the machine gun in a safer shelter a little behind the trench; in case of pressing danger, it can be put into action at some point, such as in a part of the parapet that has been destroyed, or else in a shell hole.

It is useless to lay down any absolute rules relative to the outline or dimensions of a trench, or to the placing of the machine guns it contains, for the observance of such rules would often be rendered impossible by the nature of the soil.

Frequently the ingenuity of the troops hits on the form best suited to overcome local obstacles.

In marshy ground, for instance, the trench is transformed into a parapet erected above the normal base of the ground. This parapet is made up of fascines, hurdles, gabions, sandbags, etc.: it makes use of hedges and slopes; since it thus becomes very easy to see, it should be concealed in a multitude of different ways; false parapets are even erected to deceive the enemy.

An essential condition which a trench should fulfill is that of permitting its occupants to shoot easily, in as large numbers as possible, and at the same time to remain under cover. This condition is often forgotten by troops in sectors which have remained quiet for some time; thus, with the idea of ensuring their comfort, the men put up contrivances and shelters which hamper or prevent access to the parapet, save at the spots reserved for the sentries. Commanders of units should be on the watch to prevent these abuses, and to cause loopholes to be made.

Loopholes are arranged obliquely, partly in order not to expose those using them to direct fire, and partly to furnish an opportunity for flanking fire. They may be furnished with rifles on stands, pointed in the direction of danger.

In reality these loopholes are of scant value as means of combat: they even limit the field of fire, and prevent fire from being concentrated on a determined objective. They rather constitute a means of keeping guard, and of looking out.

Nevertheless, during periods of stationary fighting, these loopholes make it possible to inflict upon the foe losses which play a large part in the war of attrition. In case of a hostile

attack, they are for the most part destroyed by the enemy's bombardment; even if they should be spared, they would be of little use. It is rather on the remains of the parapet, and on shell holes that reliance must be placed: it is in these that machine guns and automatic rifles must be placed.

Communicating or Doubling Trenches

Behind the first line trenches, there are usually constructed what are called communicating trenches, connected with the first line ones by boyaux. Their location is determined by the plan of organization. In these communicating trenches the command posts of the leaders of sections are usually placed.

These trenches play an absolutely different part from the first line ones, for they are not trenches to be fired from, save in cases where there is a sufficient slope of the ground. They are intended to afford shelter, rest, and sleep to the men who are not on duty; for this purpose they are furnished with dugouts arranged in accordance with the character of the ground, sometimes as deep as regular subterranean passages, sometimes on a level with the bottom of the trench, sometimes above it, in the sides of the trench, in niches, as it were.

Comfortable second-line shelters afford a body of troops a considerable alleviation of their stay in a trench. The commanding officers, when determining the periods of the reliefs, ought to take into account the conditions under which their troops have been placed in the line as well as the state of their health.

In sectors where the character of the ground does not permit of the construction of suitable shelters the situation is infinitely more difficult. The soldiers possess only precarious refuges where their rest is constantly disturbed by the going

and coming of men bringing supplies and of patrols, by shots, and by those who are on the watch, etc. As a matter of fact they never get many consecutive hours of rest.

From the tactical point of view, communicating trenches are of great value.

On the offensive, they permit the troops selected to follow the first waves of assault, and after them the reserves at the disposal of the commander, to get together near the departure parallel.

On the defensive, they maintain, in immediate proximity to the firing trench, the troops which are to man it in case of alarm, without exposing them to useless fatigues. They are also of great help in expelling the enemy from the first line trench, in case he has been able to take it; for they make it possible to counter-attack him, or to hem him in by the boyaux.

When the character of the ground renders impossible the construction of communicating trenches, it is a good plan to construct false ones. This subterfuge has the advantage of attracting to these trenches a large part of the fire of the enemy's artillery, and of not permitting him to suspect the weakness of the single front line.

Communicating trenches, although not in theory intended to play a part in combat, ought nevertheless to be protected by accessory defenses which should be as efficacious and as invisible as possible; for the enemy, who in his assaults will go straight ahead in order to gain ground without troubling about boyaux, will thus find himself stopped by unexpected obstacles which his artillery will not have been able to disarm or to destroy, and which, when encountered, may prove fatal to his *élan*.

Support Trenches

A position, whether or not provided with a communicating trench, generally includes support trenches, some distance behind the first line. Their location is determined by the plan of organization, and is so chosen as to place them beyond the range of the enemy's barrages, which are intended to isolate the first line trenches from the interior of the position, when a hostile attack is in progress.

The command-posts of the battalion commanders are placed on this line.

Support trenches are designed to stop the enemy in case the first line is broken. They are, therefore, firing trenches which can be speedily occupied by the reserve units, and which the first line units, when obliged to give way, attempt to reach. They may or may not be supplied with accessory defenses. According to the character and topography of the terrain, and according to the distance of the supporting trenches behind the first line, the reserve units told off to occupy them remain closer at hand or in more comfortable and less exposed shelters, a very short distance away.

As a means of increasing the resisting power of these trenches, machine guns are placed in salients whence those parts of the terrain over which the enemy might advance may be swept by oblique fire or by enfilade. These machine guns, which are only called upon in case the enemy breaks into the position, should nevertheless have their crews complete, and be all ready for action; their shelters, constructed in the most comfortable manner possible, are utilized as barracks for partial rest for the machine-gun crews of the first line.

In order to complete the system of support trenches, which cannot be indefinitely developed in depth, other machine guns

are placed here and there, either in sections of trench a few yards long, or in bombproof redoubts surrounded by accessory defenses; they should be able to sweep with their fire all important points of approach, such as ravines, bridges, cross-roads, exposed passages of every sort, where the enemy cannot avoid advancing on a narrow front. These machine guns may do considerable damage to the enemy if their crews are resolved to hold out till the last. Their shelters are generally furnished with a deep-cut or subterraneous boyau, which permits the matériel to be removed and the crew to escape to the rear at the last moment.

It is often from the shelter of these support trenches that counter-attacks to stop the enemy's progress are prepared, or *retours offensifs* directed against his first line. Thus their organization ought, as far as possible, to be planned with a view to the grouping and debouching of the units which are to be employed in these operations.

As long as the support trenches are strongly held, the position is not in the hands of the enemy.

If the position is taken, there remains behind it a second position, on which the fragments of the troops in the first may retire so as to stiffen the resistance, and so as to resume the offensive at the opportune moment.

The covering line for artillery is made up of a line of trenches and redoubts which, for lack of time or means, may not always be continuous. The location of these works is determined by the general plan of organization. They are frequently placed on a reverse slope, so as to escape the fire of the enemy's artillery, and to confront assailants with an intact and unexpected obstacle.

The covering line for artillery, like the line of support, is permanently occupied. On this line are placed the command-posts for colonels.

Boyaux are intended to connect the different trenches with one another, and with the rear. Their general direction is thus perpendicular to the first line trench and to the others.

Boyaux are essentially different from trenches in that they are solely means of communication, instead of being means of defense and of shelter. To this end they should be free from all encumbrances; it should therefore be forbidden to dig, along the sides of them, individual or collective shelters, depôts for matériel, munitions, water or supplies. It is better to construct a new element of transversal trench than to risk causing difficulties in circulation.

In principle, boyaux should be deep and narrow, so as to afford the best possible protection from the enemy's fire for the troops or carriers who are using them; but the dimensions depend primarily on the nature of the ground.

The narrowness of the boyaux renders it difficult for men to pass one another in them. This difficulty may be obviated by constructing turnouts at stated distances, so that supply porters and laborers can stand aside while troops go by, or rest without obstructing circulation; or so that units may set down men who have been wounded while passing through the boyaux. It is also an excellent plan to settle on the direction in which each boyau is to be followed — certain ones for going forward, others back; signs with arrows should indicate these directions, and if need be sentries may be posted to see to the execution of the orders given.

On occasions when the needs of the front line take precedence over all others, as for example in case of an urgent call for reinforcements, all the boyaux may be used for forward movements save those for the evacuation of the wounded; in this case the signs are turned about in those boyaux whose direction has been modified, and the sentries notified.

Boyaux do not run in straight lines, so as not to be exposed to the enfilading fire of machine guns or of batteries of artillery. Their zigzags are sufficiently marked to form a natural protection, without exasperating the troops by constant changes in the direction of their march, or excessively increasing the length of their journey. The principal boyaux have the same name from the rear to the front line.

Boyaux leading to the front spread out in branches which become increasingly numerous as they approach the first line trench. At the forks are placed signs, which indicate, in accordance with the names adopted in the official plan of the trenches, the principal direction in which each one leads. In immediate proximity to the trenches these signs should be such as to enable the troops easily to find the units, the posts where the officers are, and any sort of depôt. At important forks, sentries are placed in special shelters, so as not to impede circulation.

The men occupying the trenches should soon learn how to find their way about without hesitation or mistake in the element occupied by their company and in the neighboring ones. They must know the post where their captain is placed, the situation of the depôts of matériel assigned to their unit, the boyaux of access and of evacuation; they can thus furnish useful information to any one who comes along.

When the number of boyaux is not sufficient for the number of troops who have to use them, passage has to be regulated by the signals of sentries stationed between the *places d'armes* as on a single track railway. But it is preferable to make supplementary boyaux, provided this can be done without too much difficulty. Above all it is essential to avoid having the entrance and exit of the troops, porters, laborers, and matériel necessary for a relatively extended front effected by a single boyau forming a bottle neck. This arrangement will inevitably produce congestion, however many exits may be provided in the interior of the position.

Evacuation boyaux, specially intended to permit movement from the front to the rear, constitute, at all times, an admirable means of exit; but in principle they are reserved at periods of heavy losses for the evacuation of the wounded. Thus they are run in a more nearly straight line, and are wider than the ordinary boyaux, so as to permit the passage of litters carried horizontally.

Methodical organization and vigorous policing of the boyaux are indispensable to ensure free circulation, smooth working of the reliefs, rapidity of reinforcements, and good liaisons. The commander of the position gives all the necessary instructions to secure this.

Shelters, observation posts, telephone posts, places d'armes, and depôts are so constructed as to protect the men and the material occupying them from the enemy's fire.

They are located with reference to the sum total of the conditions which they must fulfill, or, when they are contradictory, with reference to the most important of them.

Shelters intended for troops should be dug in the ground, so as to resist heavy shells. Their depth varies according to the character of the ground, the protection given by the form of the terrain, the weather, the number of men, and the material means available. One difficulty is that they become graves in case of a cave-in. They are therefore provided with exits at opposite ends and are permanently furnished with shovels and picks. Among them may be included command-posts, which are intended to provide shelter for the leaders of the different units, and their staffs.

Observation posts are intended to enable their occupants to see; but the finding of places where this condition can be fulfilled, as well as the measures which must be taken to protect them, inevitably expose them to grave dangers. It is a good thing to have several of them for the same purpose. The observation post for the commander is always selected before the regular command-post, which should be as near to it as possible.

Places d'armes are used to assemble reinforcements and reserves, where they will be sheltered from the observation and the fire of the enemy.

Depôts occupy central positions, in order to be easily utilized by the different units they supply; but they should be carefully concealed so as to escape being seen by aircraft, and solidly constructed so as to withstand the projectiles shot by heavy cannon.

CHAPTER II

TRENCH DUTIES

Trench duties include the following: ensuring the occupation of the terrain whose limit is marked by the first line trench; preventing the enemy from gaining access thereto; observing the dispositions taken in the opposite position; transmitting to the Command any information obtained; inflicting losses on the enemy; finally, preparing the forward movement.

Liaison is the word used to indicate the means by which the units installed in the trenches are enabled to keep in constant communication with their superior officers, with the units on either side of them, with the artillery and the other arms, and vice versa. It is effected laterally and in depth.

The proper working of the liaisons is of great importance. It permits the units in line to understand and to support one another; it makes possible communication of all sorts between these units and the Command, and also constant collaboration between the different arms. By means of these liaisons, each commander is apprised of every movement, and can give his orders rapidly and with certainty; by the same means, the infantry, the artillery, the aviators, the engineers and the cavalry can collaborate to good advantage.

The duty of obtaining and forwarding information and messages is entrusted to aërial observers, to observers on the ground or to liaison agents.

Observers in airplanes or in balloons are furnished with high-power glasses to enable them to obtain information concerning enemy's troops situated far away. Since they communicate with the earth by rapid means (such as wireless in the case of the airplanes, telephones in that of the observation balloons, or visual signals in both cases) they can pass on information speedily to the Command, and also transmit orders. They have very powerful photographic apparatus, which enables them to verify the information they have secured.

Observers on the ground have the advantage of a fixed position; they remain in place at all times and seasons, day and night. They are thus able not only to complete and to control the items furnished by the aërial observers, but in certain cases they constitute the sole means of information. They are installed in observing stations specially fitted out, well protected and concealed. The information they furnish is gathered in and coördinated in every body of troops by an officer specially assigned to this task, and known as the "intelligence officer."

The liaison agents of the larger units are not merely means of transmitting information, but also means of obtaining it.

The commander of every large unit, such as an army, army corps, or division, details a liaison agent to each of the units immediately below him. This agent should be chosen on account of his military knowledge, intelligence, and judgment; it is his duty to furnish his commander all information of particular importance, to give him any explanation about the state of affairs which may be useful, and to inform him in regard to the execution of his orders.

In the smaller units, on the other hand, such as regiments, battalions, etc., the liaison agents are detailed by the inferior

units to the superior ones; practically they are used only for the purpose of transmitting information.

Transmission of information is secured by numerous means of liaison; such as telephones, runners, signallers, rockets, Bengal lights, carrier pigeons, dogs, cycles, telegraphs, and automobiles; they are chosen according to circumstances, and the ground to be traversed.

All these means of liaison ought to supplement or replace one another according to circumstances; they should, therefore, be utilized frequently, so as to be kept in working order. In every regiment, one officer is specially charged with the organization and coördination of the liaisons; usually the telephone officer does this. In every unit larger than a regiment, a staff officer looks after the liaisons. The commanders of the different units, moreover, take great care to provide for means of liaison when drawing up the plan of organization of a position.

Lateral liaisons are effected either by way of the first line trenches or of the communicating trenches, or else by more complicated routes; the boyaux and, if necessary, even open places are utilized for this purpose. Liaisons in depth are effected by the boyaux and open spaces; in the interior and at the rear of a position, roads are utilized for this purpose.

The most practical and the swiftest means of liaison is of course the telephone. In every army there is a general system of telephone lines, and connected with it there are special systems for each army corps. Each system includes (1) a system for the commanders, connecting the command-posts of the different units, and also connecting the units of infantry (regiment or battalion) with the artillery which has been

given the task of supporting it; (2) a system for the artillery, connecting the artillery commanders with one another, and with their observing stations, as well as with the infantry which it is their duty to support. The liaison of the artillery and the infantry is thus doubly provided for by the system for the commanders and by that for the artillery.

The plan of these telephone systems is drawn up by the heads of the telephone service of the first line; it avoids the construction of an excessive number of direct lines. Confidential information should not be telephoned except in cipher; telephone communications should be regulated by a rigorous discipline so as to avoid cumbering the lines with useless conversations.

The telephone system for an army is set up and operated by army telegraph sappers. In that of an army corps the system for the commanders is set up and operated by army corps and division telegraph sappers; in the case of regiments and smaller units, it is operated by the infantry telephone men. The system for the artillery is set up and operated by telegraph sappers as far as the "centrals" of the artillery groups, and beyond them by the artillery telephone men.

The weak point of the telephone is that it is often broken by a bombardment, or by earthslides; this can be remedied by burying the important lines, by duplicating them along different routes, and by summoning the telephone workers to make repairs at the earliest possible opportunity. The telephone system, both lateral and in depth, is the first thing to be installed in a trench. For this purpose, gangs of telephone men, furnished with all the requisites, follow the troops. The lines are run above ground at first, so as to save time, but are subsequently buried.

Wireless and ground telegraphy serve to double the telephone lines and to replace them when they have been cut. Portable machines for this purpose are distributed to the army corps and divisions; but only in small numbers on account of the fact that their currents interfere with each other. Wireless installations moreover hinder the working of the wireless liaisons with the airplanes, and those for ground telegraphy make difficulties for telephone conversations and for listening posts.

The runners, or liaison agents, are alert, brave, and intelligent soldiers, who are given the task of carrying orders or written information. They go two, or even three or four at a time, in the case of important messages, separated by a sufficient interval so that two shall not fall victims to the same shell. Their duty is to bring the message entrusted to them to its recipient, come what may. They often find opportunities to look about and observe during their trips, and thus to furnish useful information. In certain cases, chains of runners are established by means of relays, each of which has two or three men at its disposal.

Signallers have the duty of maintaining liaison by arm signals, with or without flags, during the day, and by lanterns or projectors during the night. This is a delicate task, for they must manage, by choosing their positions well, to be seen by those with whom they would communicate, without being exposed to the enemy; such conditions are frequently almost impossible to realize. There are not more than so many signallers in each battalion or regiment, and they receive a special training; if they are absent or out of action, or insufficiently trained, signalling becomes very difficult. There are in fact so many difficulties in the way of securing good

liaisons by means of signallers, that they should be looked upon merely as subsidiary.

Signalling by projectors ought however always to be organized with a view to supplementing or temporarily replacing the telephone lines. In order not to reveal the position of the instruments to the enemy, it is used as far as possible only for sending messages from the front to the rear.

Rockets are used to establish immediate liaison from front to rear, especially with the artillery. They may have different meanings, according to the rules laid down for their different colors: a call for a barrage or for a deeper or for a shorter fire, notice of a hostile attack, announcement of arrival at a determined point, etc. Bengal lights of different colors may be used, when the terrain is suitable, to obtain the same results. The code adopted must be very simple, and identical throughout the army, if errors are to be avoided.

Carrier pigeons and dogs can take the part of messengers from front to rear; but they run the same risks as the infantrymen whom they accompany, and may be put out of action before they have accomplished any purpose. They have the advantage of runners in that they are faster and less vulnerable; but on the other hand they cannot vary their course to suit the sender. The pigeons utilized by the units of the first line are grouped at pigeon posts; they are cared for there by men who are specially trained for the purpose; they ought to be treated less well there than at the dovecote, in order to cause them to return to the latter at once, when they are let go. Any message which they bring back to the dovecote should be sent on without the least delay to the person for whom it is intended.

Cyclists are used to advantage inside the position, as soon as there is a practicable road; they are swifter than runners, without being any more vulnerable. It is worth while to create relays of cyclists on such routes, to replace severed telephone lines or runners.

Telegraphs and automobiles are the means of liaison which are used especially for communication between the position and the rear. Wireless telegraphy, however, is employed by the commander of the position and by the artillery, especially in broken country, when keeping liaison with the airplanes.

Under exceptional circumstances, automobiles are used in the interior of the position; for instance, motor-carried machine guns, when they have had occasion to make a dash forward, will do better to bring back important and urgent information to the commander themselves, rather than try to send it through by means of uncertain intermediaries.

To sum up, two means of liaison are essential, telephones and runners; others are of service in special circumstances, or when the former are lacking.

The Stay in the Trenches

It is not especially dangerous to remain and to go about in a normally constructed trench, except in case of an intense and well-conducted bombardment, provided, of course, one respects the rules derived from experience. On the other hand, even a momentary stay in a trench may, at any time, prove fatal to the newcomer or the greenhorn, as well as to the fool or the braggart.

In the presence of an attentive enemy, every fault receives severe chastisement at his hands; individual imprudence is instantly punished by death; the revelation of collective movement draws murderous fire; an ill-concealed machine gun

is a target for artillery fire. Thus, prudence must be the rule of all those who stay in the trenches, or pass through them.

Silence is one of the essential rules of the trench. It should become the unvarying habit of the troops, because of its many advantages; it keeps the enemy in ignorance as to the strength in which the trench is held; it helps the sharpshooters and the observers to do their work, and to detect the least noise; it enables the chief to transmit an order from man to man, without raising the voice; in case of alarm, it helps each man to take his place quickly. It is one of the first qualities of well-disciplined troops.

Rôle of the Commanders

The commander in a trench has various duties, according to the extent of his command. He must take account of the professional ability of his subordinates, the morale of his soldiers, the task confided to him, the situation of his trenches, and of all special or unforeseen circumstances, in order to determine for himself his line of conduct.

One principle which no commander should forget is the necessity for his frequent presence in the midst of his men. It would be childish to try to determine the exact number of hours which the leader of a small unit should pass in his trenches, or the number of visits which the leader of a large unit should pay to them: so many conflicting necessities arise that each must learn from his conscience alone how to fulfill his whole duty.

Direct contact with the troops on as many occasions as possible is the most certain way to gain their confidence. A leader whose face and voice are known, whose reputation is established with his subordinates, can have a pronounced

influence before, during, and after the combat. On the other hand, a leader who has not taken the trouble to make himself known cannot enjoy the same ascendancy, no matter how great his coolness in face of danger.

The frequent presence of the commander is, moreover, indispensable for other important reasons. It permits him to ascertain whether the orders given have been well executed. Such verification, carried out within the limits appropriate to each grade of the command, forestalls possible negligence and cruel surprises.

It also helps the leader really to know the trenches, to take cognizance of all the difficulties, and to avoid giving any orders which are impracticable or impossible of execution.

Finally, it gives him the chance to examine his position as a whole, to improve and draw together the links of his chain, to face all eventualities, either of attack or of defense, to discover and fill in all gaps — in a word, to look ahead.

To see means to foresee. Negligence and carelessness on the part of the leader are generally reflected, little by little, right down to the lowest steps of the hierarchy, and produce deplorable effects.

On the contrary, the commander who has seen with his own eyes the trench and the terrain, with reference to which his orders are drawn up, expresses his thought with a precision and a certainty which no theoretical instruction can impart.

Activities of the Troops

If the leader of a medium-sized unit seems to lose interest in the trenches, or at least to neglect them, the leaders of the small units under his orders will have a tendency to take root in their command-posts. From that moment the troops stagnate,

grow slack, and think of but one thing — the relief. Their attention, instead of being continually directed forward, is turned to the rear. Thus work, even during periods of calm, is indispensable for the moral and physical health of all.

An excellent way to occupy the soldier, and to sustain his capacity for offense, is to turn his thoughts continually towards the opposing trench and to direct his activity against it.

The best shots of the company are given the task of covering the vulnerable places in the enemy's line, and all eventual objectives.

Men of careful attention and tested judgment are chosen as watchers, to discover the enemy's movements, the hours of his relief or supply, his offensive or defensive works, the location of his trench weapons or machine guns, and his observation posts. They are furnished with watches, spy glasses, and periscopes.

The most active and venturesome serve as patrols, and endeavor to reconnoitre certain important points, to gather information as to the adversary's intentions, and to take prisoners.

It is well to point out to the soldier the effect of attrition; thus, let him see how, by putting out of action, every day of the week, and on every mile of the front, a small number of enemies, immense damage to the opposing army will ultimately result.[1]

The necessary activity in the trench degenerates into fruitless and dangerous enterprises, if it has not predetermined ends, or if it involves the troops in costly struggles. The initia-

[1] Sixteen men per mile each day put out of action makes 240,000 per month on a front of 500 miles.

tive in small operations, if left in the hands of leaders of units who are inexperienced or impatient, may cause useless loss of men, or regrettable waste of artillery ammunition. Thus, the Command watches carefully over the leaders of the units in line, in order to avoid abuses as well of action as of inaction

Besides this activity directed towards the enemy, there is considerable work to be done every day in the trench itself. This work, whose importance escapes those who are not accustomed to trench life, consists in rebuilding parapets, boyaux, and shelters destroyed by bombardment, by water, or by frost; in replacing and completing accessory defenses, digging wells and drainage channels, putting in new latrines and refuse-pits and filling up the old ones; taking measures against landslips; repairing the endless damage caused by shells, which uncover bodies, obstruct passages, and cut telephone lines. In fact, in periods of intense bombardment, this work is so exhausting that it uses up the troops who are going to fight, and should be, in part, turned over to workmen sent from the rear during the night.

The supply of the trench with food, munitions, and matériel of all sorts should be effected daily. It can generally take place only at night, in order not to expose those who are entrusted therewith to loss or delay.

Food is brought by the cooks and, if need be, by certain fatigue parties placed at their disposal by their units; the personnel of these parties is changed as much as possible in order to increase the number of soldiers capable of establishing liaisons day and night between front and rear. The kitchens are situated behind the front, so as to be comparatively sheltered from bombardment and not betrayed by their

smoke. Since it is a long way from the kitchens to the first line trenches, it is worth while to shorten the trip as much as possible by the use of light railways, barrows, and push carts, both in order to relieve the cooks, and to increase the comfort of the soldier in the trench.

The kitchens in each company are under the charge of a responsible non-commissioned officer, and are inspected without warning by officers and N. C. Os. detailed by the captains or majors; they must be kept absolutely clean, and also their surroundings, and must employ none but men regularly assigned to them.

The supply of infantry munitions is usually effected by the relieving units. Each man carries a specified number of cartridges; if he has not used them up at the moment when he comes back, he turns the surplus over to a munition depôt organized for the company and at the disposal of the captain; there is also a battalion depôt, supplied by similar means. An account exhibiting the daily intake and distribution enables the commanding officers to know at any moment whether the number of cartridges is sufficient for such needs as may arise. The same system of depôts is employed for grenades, for trench-weapon ammunition, for lighting or signalling rockets, etc., but the supply is carried out by special details coming with those which bring the matériel.

Artillery munitions are generally replenished by employing all the improved means of transport which are compatible with the situation of the batteries. The supply of the heavy pieces depends especially upon the service in the rear; everything is done to improve the railways and motor transports, which insure a rapid and regular arrival of projectiles at a convenient distance from their pieces.

The supply of matériel includes the bringing up of wire and posts, of all sorts of accessory defenses, tools, beams, wood, and straw, in short of all the utensils and articles necessary to the organization, the security, and the comfort of the trench.

It is determined by the daily demands of the leaders of units, based upon their immediate needs or their expectations for the future. The transport of matériel is continued as far as possible by mechanical means in order to gain time and to save labor and waste of men; then it is carried forward by special gangs of workmen, taken from the troops in the rear. At the point where the matériel is distributed to the workmen, the leader of each gang receives a list of what is turned over to him; for this he must bring back a receipt signed by the commander of the unit supplied.

CHAPTER III

RELIEF

Relief is the operation of replacing the troops occupying a certain group of trenches by other troops, either equal, superior, or inferior in strength. It includes the march of a unit from its cantonment to the trench, the replacing of the unit in line, and the return of the unit relieved to the rest cantonment.

General relief is the term applied to the relief of a whole position, when the troops relieved are large units, such as army corps or divisions. Interior relief is the term applied to the relief of one sector or a portion of a sector, when the troops relieved are brigades, regiments, or battalions.

General Principles of Relief

Interior relief is executed every six days. This period may be reduced when the stay in the trenches is particularly arduous, or prolonged when it is comfortable; it constitutes the minimum necessary for getting acquainted with a new sector, for undertaking and carrying out works of construction and installation, or for preparing and executing raids.

It is advisable to arrange the relief between units which have friendly relations to one another, such as battalions of the same regiment, in order that the trench duties may be more easily carried on and continuity of effort maintained. For this purpose it is necessary that the units in service, such as regiments, should be echeloned in depth, one part at the

cantonment of "part-rest" (such as the brigade or division reserve), while the other part holds the trenches.

It is also advantageous not to shift troops constantly from sector to sector or region to region, except in cases of tactical necessity. Units which are sure of coming back to their trenches fit them out pleasantly, keep them up with a regard for hygiene and cleanliness, and increase the solidity of the defenses and the security of the shelters; they show an interest in the work undertaken, study all the details of the enemy's position, and prepare day by day for the future attack.

General relief is executed either when large units are going to "full rest" at the rear, in suitably chosen cantonments or else when units are removed from one part of the front to another for strategic reasons.

It is executed in the same way as interior relief; divisions, brigades, and regiments being relieved successively, but never simultaneously.

Therefore it is enough to study the mechanism of the relief of small units.

The march of a unit from its cantonment to the trenches is a night march carried out according to the usual rules.

The time of departure is so fixed that the unit shall arrive at the trench and effect the relief early enough for the unit relieved to get out of sight of the enemy before daylight. In summer, when the nights are very short, the slightest delay may be fatal to the unit relieved, if it should be seen by the enemy's artillery and taken under fire.

There is every advantage, even after a rest, in transporting the men by motor trucks as far forward as possible, if their

cantonments are distant, so that the whole unit shall arrive fresh in the trenches.

As soon as the march brings the men within sight of the enemy, they should neither smoke, flash electric torches nor make any noise. During halts, the roads are left open and crossings and forks are kept clear.

At points agreed on in advance, each battalion finds guides sent by the unit which it relieves. There is usually one guide for each platoon leader, one guide for each company commander, and one for each battalion commander. These guides attach themselves to the commanders of the units to which they are assigned, and accompany them until they reach the commanders of the units relieved; they do not allow themselves to be diverted from their errand, even for a moment, under any pretext. When numerous groups of guides are assembled at one point, the leaders of each one must keep on the alert, to see that no battalion or company goes past without getting its guides.

The departures of the various elements are calculated so that all the units in line shall not be relieved simultaneously. Care must be taken at the approaches and in the boyaux to avoid straggling, clogging, and crossing of units. The commander of the unit relieved sends in advance to the commander of the relieving unit all needful information, and gives his guides precise instructions as to the routes to be followed.

The replacing of the unit in line constitutes the relief, strictly speaking.

Its method of execution depends on the number of men concerned; since two units of the same theoretical strength, may, according to circumstances, be very different in the number of men that they actually contain.

It also depends on the front to be occupied, for the commanding officer often takes the opportunity offered by the relief to increase or diminish the length of the trench entrusted to one unit.

These are the considerations that govern the relieving unit in making its arrangements to hold the first line with elements which will afford sufficient density, and to distribute the surplus, if need be, in the shelters of the second line, in the support trenches, or in reserve. Such dispositions should be planned before starting, in order to avoid hesitation, delay, pushing back, and crowding, all of which are sources of disorder, fatigue, and danger.

If the relief is complicated by simultaneous changes in the two factors of *effectives* and *front*, and thus becomes particularly difficult to carry out, it is indispensable to take special measures for its proper execution; in such cases a detachment of N. C. Os., like the camping party that is sent ahead under command of an officer to prepare a cantonment, goes into the trench the night before to prepare all the details of moving in. These details attended to, the N. C. Os. wait in the trench for their respective elements, which are brought up by the guides, and help the men to install themselves quickly and silently.

The true unit of relief is the battalion.

While the relieving elements come to take their stations and the elements relieved begin to move toward the rear (so far as possible by another route or by other boyaux), their commanders meet to give each other local information and directions.

The commanders of battalions and companies relieved transmit to the new arrivals, at the respective command-posts,

all information concerning the trench, maps, sketches, photographs, results of reconnaissance, state of works undertaken and works projected, positions of depôts of munitions, of food and of water, condition of these depôts, amount of matériel, points in the line to be specially watched, indications of the intentions of the enemy, dangerous approaches, etc. The platoon-leaders do likewise, furnishing all sorts of practical information concerning the parts of the trench they occupy.

As soon as their units are in place, the company commanders send to the battalion commander, by telephone, brief notification that the relief has been accomplished with or without incidents; he in turn reports back in the same manner to his superior officer.

Immediately after the completion of the relief, the commanders of the different units should make sure of their liaisons both laterally and in depth. For this purpose, they send N. C. Os. or intelligent soldiers to get into touch with the elements on the right and the left, and to ascertain that all parts of the trench are manned with numbers proportional to the needs of the moment. Each company commander has the command posts of adjoining companies and battalions reconnoitred not only by one agent but by several, so that he will never find himself at a loss. The telephone operators make sure that their lines are in working order. The battalion commander, on his part, having as liaison agents an N. C. O. and a soldier for each company, causes first one of them and then the other to reconnoitre the command-posts of his captains.[1]

[1] A practical way of establishing reciprocal liaison between the battalion commander and his captains is the following:

Each company, on leaving the cantonments, sends two men to the battalion commander. These men march with the battalion commander's liaison as far as his command-post, with which they familiarize themselves; thence they rejoin their respective companies, guided by an agent of the commander of the

The mechanism of relief, apparently quite simple, is complicated by a mass of detail arising from the terrain and the circumstances. The way of accomplishing it, therefore, should not be too narrowly or precisely laid down. But it is necessary for the battalion commander to give exact orders, and for the captains to see to it that they are strictly executed.

A relief badly carried out results in masses of men being huddled in the boyaux, able neither to advance nor retreat, and to whom it is impossible to give orders. If the enemy attacks at such a moment, or even if he limits himself to well-adjusted artillery fire, the results of the errors committed may prove disastrous.

One may judge of the degree of instruction of troops by the manner in which they carry out a relief; but as there are always two units involved, care must be taken, in making this judgment, not to attribute the mistakes of one to the other, which is often the first victim.

As soon as the liaisons are established, the leaders of the different elements make their initial tests after taking their stations. They have the battle alarm given, so as to cause each man to occupy the post which he is to take in case of an attack, and to make certain that the trench is well defended. The roll call is taken at this juncture.

These initial tests are for the purpose of making all the necessary verifications and observations. They are directed

battalion to be relieved, and accompanied by another agent of the commander of the relieving battalion. The agents of the two battalion commanders bring back with them two other men from each company. The second liaison agent of the relieving battalion commander then goes back with these two men to identify his company.

This movement of going and coming, utilized for the transmission of daily items, of orders and of reports, familiarizes a considerable number of soldiers from the outset with a route which it is *absolutely essential* to know in case of unexpected events or of breakdown of the telephone connections.

upon the communications between the different command-posts to make sure that their itineraries are properly chosen from the tactical point of view, and arranged in the best possible way from the practical standpoint; on the state of the parapet, which should not be obstructed by shelters, and ought to be maintained at a sufficient height and thickness; on the state of the accessory defenses, shelters, observation posts, boyaux, latrines, refuse-holes, munition depôts, etc.

These reconnaissances permit the different leaders to get a look at the trench which they occupy as a whole, and to decide on any improvements to be made; they enable them to make certain how the work of their subordinates is organized and performed, and to know whether the liaisons established are working properly. They form the subject, in each company, of a written report. The battalion commander summarizes and coördinates these reports, at the same time that he keeps in mind everything which he has himself observed. He thus sends to his superior officer the report of the installation, accompanied by a sketch.

A sketch made at night is of slight value; it can do little more than reproduce the sketch which is usually passed on by the commanders of the unit that has been relieved, together with an indication of the places occupied by the elements of the relieving force. In this manner, inaccurate sketches are transmitted indefinitely, from unit to unit, because the guiding principle is to furnish without any delay the information demanded. It is the duty of the captains and battalion commanders to verify the exactness of every kind of document handed over to them, and to indicate all the rectifications to be made in it. They make use, to this end, of all the information obtainable, and particularly of photographs taken by

aviators. Such a work can only be accomplished in the daytime, and demands care; it should be regarded as performed not only for the benefit of the unit in actual occupation, but for that of all those which succeed it in the same trench.

Reconnaissances during the daytime thus complete those of the night, and above all make it possible to study the enemy's position. They ought to be made by officers and N. C. Os. of all ranks, for they serve to give the men exact information about their situation and that of the units close to them, about the enemy's trenches, and about all the points to be specially watched.

The soldier, arriving at night, his body tired from carrying his pack, ammunition and provisions, his mind dulled by the march and by the danger, is not generally apprised of the lay of the land when daybreak comes; and if the trench possesses important salients or advanced posts, this lack of local topographical knowledge may cause mistakes. He should be enlightened as early as possible by precise information from his superior officers.

The return of the unit relieved to its rest cantonment includes getting out of the trench, and then the march to the cantonment.

Detailed orders concerning the relief are given by the battalion commanders, who carefully provide all the necessary measures. Only the battalion commander can regulate the movement so that there shall be no collisions, crowdings nor delays; good intentions and previous agreement between captains are never sufficient, unless they are directed by clear and precise orders.

Getting out of the trench requires as much method as getting in. It is, if possible, effected by different boyaux and different routes, at least at the start.

The march is made by platoons, the platoon leader leaving the trench last, after giving full information to his successor and making sure that the new platoon is installed; an N. C. O., accompanied by a man who is intimately acquainted with the route, marches at the head of the platoon.

The captain appoints a place for his platoons to reassemble; he does not leave his trench until the guides sent to bring up the relieving platoons have come to report on the execution of their errand; these guides attach themselves to his liaison until they are able to rejoin their platoons. The place of assembly of the company is fixed far enough away to clear the approaches of the position entirely, not to block general traffic, and to be as far as possible protected from the enemy's fire. Roll call is taken in the platoons and reported to the captain.

On the way out, the most absolute silence must be preserved. Men who have been relieved have a tendency to scorn the danger which they are leaving behind; they should remember that the men who have taken their places are exposed to the fire of artillery whose observers are listening for the slightest noise. This artillery will not limit itself to the first line when it opens fire, and may make them pay dear for their rashness by accompanying them on their return journey.

All rules of conduct for the march in the boyaux are strictly observed. In case of doubt, troops relieved always give way to relieving troops.

The battalion commander, who gets in touch with his successor at the command-post, receives there, either by tele-

phone or by liaison agent, the report of the relief of each company. He leaves with his liaison as soon as the last company is relieved; he is accompanied by the four stretcher-bearers usually located near his command-post, so as to bring along or to report any wounded who may have been left behind.

The march to the cantonment is conducted in accordance with the ordinary rules for night marching. It is the first occasion on which the men are once more taken in hand, after the relaxation of their habits which often results from a stay in the trenches; discipline of the ranks is therefore vigorously maintained.

Save in case of necessity the battalion commander does not fix a spot for his battalion to assemble; in order to spare the men useless waits and fatigues, each company goes directly to the cantonment which has been assigned to it.

The cooks depart before the battalion is relieved, as soon as the last meal has been prepared, under the conduct of a N. C. O., designated by the battalion commander; they march in perfect order, with their small carts if they have utensils to transport, or else with the necessary carriers; they install themselves at the cantonment in sufficient time to be able to provide hot soup or coffee.

The ambulance outfit and the horses of the battalion come out from the cantonment where they were stationed in the rear, repair to a point determined by the commander of the regiment, and wait there for the companies of the battalion to pass.

During the march, an energetic N. C. O. and several men are placed behind the rear rank of each company, in order to prevent any laggard from stopping. If a man is so sick or

tired that he cannot keep up, he is given a certificate signed by the captain, and awaits the battalion ambulance. This ambulance follows the last company relieved, and is accompanied by the rear guard of police of the battalion. No laggard must be left behind; if necessary the pace of this rear guard is slowed down.

Marches executed after a stay in the trench are painful, especially in winter, because the men's bodies are numb from immobility, and their feet tortured by cold and wet. When a long distance must be covered, the use of auto-transports brings great relief to the troops.

On arrival at the cantonment, the companies rest. The next morning, before beginning any work, the captains and the majors make a rapid inspection, in order to prescribe such modifications as are often necessary in the arrangements made by the party preparing the cantonment and adopted during the night; modifications made at a later date would cause useless fatigue and loss of time. Then the men settle themselves; they care for the needs of their health, as well as for the cleaning of their arms and of their effects. The duties of the place are taken over at the hour fixed by the commander of the regiment, in accordance with the agreement concluded with the preceding one, if such there was; sentries are placed at the exits, the police guard is posted, the patrols ordered and their rounds prescribed.

The major and the captains look out for the sanitation of the cantonment; they insist that the location of the latrines and of the refuse pits be fixed, from the moment of arrival. They inform themselves concerning the attitude of the troops towards the local inhabitants, and examine any complaints or claims that may be made. A unit with habits of order and

discipline is well received by the local population, which knows that it deserves respect and admiration.

Good conduct and carriage, and external marks of respect, are rigorously exacted. No man ought to go out before he has washed and cleansed himself and his equipment in the manner prescribed. At each meeting of the company, a few of the regular evolutions, or a part of the manual of arms, will restore to the soldier a sense of the discipline of the ranks.

A body of troops which is clean, carries itself well, salutes correctly, and manoeuvres properly, shows the good leadership and discipline which bring victory.

PART III

ATTACK ON A POSITION

CHAPTER I

GENERAL REMARKS ON OFFENSIVE COMBAT

The general form of offensive combat is an attack on a position.

Even in the war of movement, the encounter between two forces takes this form. For, whenever troops are in contact, they take advantage of short cessations of fighting, and, above all, of night time, to dig trenches, to make shelters for themselves, and to anchor themselves to the ground; in other words they organize positions.

Thus the offensive, starting from an organized position and having as its objective a hostile position, opens with an assault.

This assault should be preceded by a preparation, whose object is to facilitate it in every way.

It has not the character of a rapid and decisive act, but is developed progressively, with alternations of movements and stationary periods. It may thus be designated by the name of an attack, in order to reserve the name of assault for the separate acts forming parts of a struggle which is often protracted.

In case of success, the offensive is continued, either by pursuit, in case the enemy attempts to get away, or by a march of approach, in case he occupies a second position behind the

first. As soon as the enemy resists, the phases of the offensive are renewed.

These phases succeed one another in the following cycle: preparation of the attack, attack, pursuit, march of approach — up to the moment of definitive victory. This order is invariable, whatever the initial phase may be — march of approach in a war of movement, attack in case of a surprise — but the duration and importance of each phase depends entirely on circumstances. They should follow one another, without respite, in such wise as to prevent the enemy from occupying at need the successive positions which he has previously organized, or from preparing fresh ones.

These phases will now be studied and described in their complete development, as carried out by the divisions of an army corps which has been given the task of attacking a position. By reducing, according to circumstances, the scale of one or another of them, it will be possible to get a picture of a specific offensive combat.

Part played by the different Arms in the Engagement

The infantry and the artillery, acting in close and constant liaison, are the two arms which play the principal part in the combat.

The heavy and the field artillery prepare the way for the infantry to enter the battle, by smashing the enemy's position with their fire, by reducing his artillery to impotence, and by destroying his defensive organization. During the attack they protect the infantry — by fire directed against the enemy's batteries, as soon as the latter get into action, and by barrage fire, intended both to prevent the arrival of the enemy's reserves, and to stop counter-attacks. They also facilitate the in-

fantry's progress by concentrating their fire on specific objectives.

Because of this interdependence, a general commanding a first-line division has under his orders, over and above his divisional artillery, batteries of corps artillery, and batteries of heavy artillery, so that he can utilize them during the combat. Rapidity and efficacy of fire against the enemy's batteries, many of which are not unmasked till the very moment of the attack, are of such importance that it is sometimes worth while, if the number of guns be large enough, to allot to certain artillery units the special task of acting as counter-batteries; those who are acting as observers for them, both on the ground and in the air, see to it that fire is opened as rapidly as possible on such of the enemy's batteries as are taking the attacking infantry for their target.

The infantry is launched against the indicated objectives without afterthought; that is to say, with the certainty that they will not be left to their own resources, in case they reach their goal in reduced numbers. It is the duty of the army corps commander, who has calculated beforehand the numbers necessary for each task, to see to it that the combat is carried on methodically, and if need be to call on the army commander for such measures as are necessary for the accomplishment of the task assigned to him.

The aviation corps affords valuable assistance in the conduct of the combat. From the beginning of the period of preparation, it seeks to blind the adversary by striking at his airplanes and captive balloons. Before, as well as in the course of the action, it furnishes information in regard to the movements of the enemy's troops, and the location of his batteries. It also adjusts the artillery fire. It therefore makes possible

the disorganization of a counter-attack, even before it has been launched, by discovering the point where it is being prepared, and adjusting the fire on that point. During the combat, it is obliged to expose itself especially freely, in order to make precise observations; but it thus plays one of the most useful and heroic parts possible. Fighting airplanes protect from the enemy's machines those planes which are used for observation and for directing fire, as well as the captive balloons. Sometimes, too, the airplanes take a direct part in the battle, by attacking reserves, concentrations, troops on the march, important points, etc., with bombs and machine-gun fire.

The engineers help in preparing the assault, and subsequently, in organizing the conquered position.

The cavalry, utilized in case of pursuit, does not move without reliable information, in order to avoid premature action and fruitless sacrifice.[1]

[1] In February, 1915, the author compiled a "Memorandum" in order to recall to his young officers, in half-humorous and half-serious fashion, the modifications which have taken place in the conduct of battle. This little work adopted, and at the same time transformed, the phrases of our old regulations, and expressed itself, for example, as follows:

"The principal arm in combat is no longer infantry; it is artillery.

"The artillery conquers and holds the terrain; the infantry occupies it.

"Brave infantry, energetically led, may, however, march against trenches provided with machine guns and barbed-wire entanglements, without artillery preparation; it is certain to get possession of the terrain, but in a tragically fatal manner. The same holds true of infantry launched in an attack against intact artillery.

"Experience of recent combats has indeed demonstrated that in the struggle between metallic and human projectiles, the former are bound to win."

And elsewhere,

"The organism of the army may be compared to that of the human body: the High Command constitutes the head and brains of the army; the artillery is its body with its strength and power of resistance; the infantry are the legs, indispensable for forward movement; the engineers are the arms which are used for manual labor; the aviators are the eyes without which all effort

Rôle of the Command

An army corps commander, when he has learned from the army commander the limits of his zone of attack, his task and his successive objectives, proceeds to make his reconnaissances.

Before the attack, he establishes a detailed plan of action, arranges his divisions, gives them their instructions and their objectives, determines the placing and eventual duty of his reserves; he indicates to the artillery and to the engineers their essential tasks, he orders the artillery commander to draw up a plan of action, distributes the airplanes and the balloons which have been placed at his disposal and tells them what is expected of them, and provides the necessary measures for supply and evacuation. In his plan of action, he takes into account the reliefs which may become necessary, as well as the manoeuvers for widening possible breaches. He assigns to each unit a front which should be narrow and deep when the terrain of attack is suitable to an advance, but widely extended when the chances of progressing are slight.

During the attack, he decides on the reliefs necessitated by losses or fatigue, and divides up the artillery at his disposal, according to the ends to be attained. He reports to the army commander frequently on the situation of his troops.

If the attack succeeds, he maintains contact with the enemy, gives all necessary information to his cavalry, and pursues the adversary vigorously. When his troops are stopped by a new

is fruitless; the cavalry, an elegant adornment, left behind with the baggage where it will be sheltered from the hazards of conflict."

This military parody contains obvious exaggerations, particularly on the subject of the cavalry, which played a heroic part in the early stages of the war and many units of which have, since that time, fought on foot with as much bravery as the infantry; but it nevertheless reflects very faithfully the feelings experienced by the troops in regard to combat.

position, he calls for a march of approach, takes all measures necessary for attacking the position, and strives to carry it.

He thus continues until he has attained the position fixed upon as his ultimate objective. At this moment, if the pursuing troops run up against a new position, he executes a march of approach, gives orders preparatory to the attack, sends forward the necessary artillery, and reports to the army commander, whose directions he then awaits.

Division commanders, and commanders of smaller units, should concentrate their minds on the task of fulfilling the instructions given to them, and of attaining the objectives assigned to them.

It is indispensable to the good progress of the combat that the tasks assigned to all ranks should be clearly defined, and the objectives exactly determined. Soldiers must know what is expected of them; they ought also to be assured that, if they devote themselves entirely to their task, they will not be abandoned to their own resources in case of difficulties.

If there is an objective beyond which the advance should not be pushed, this fact should be clearly indicated. The division commander and the leaders of the smaller units must halt their men without pushing on further, and without making decisions which belong to the High Command. It is much more useful, moreover, in many cases, to secure possession of one captured position than to press forward with insufficient means to the attack of another; the former course serves both to confirm a success that has been won, and to avoid a possible check whose consequences might prove serious.

The momentary halt on a line previously fixed, and the organization of the conquered terrain should in no wise pre-

vent the commander of a small unit from taking all the measures necessary for eventually continuing the forward movement. His patrols and scouts should remain in contact with the enemy; they furnish him information which he does his utmost to expedite to his superior officers.

If the continuation of the movement is ordered, and if it is assumed by fresh troops, he passes on to those troops all the information that has been gathered, furnishes them guides if need be, and holds himself in readiness to support them.

CHAPTER II

PREPARATION OF THE ATTACK

The preparation of the attack is the more delicate the longer the troops have occupied the same trenches, because the enemy has had leisure to organize and fortify his position, and to furnish it, little by little, with all the most perfect means of defense.

It is, on the other hand, much shorter, and at the same time it presents better chances of success, if the enemy has but recently been installed in his position. This case occurs during a pursuit, when the conquered side tries to face about and resist; then, it is advisable to hurry the attack.

The preparation comprises several parts, successive or simultaneous, according to circumstances. These are:

The detailed study of the two opposing positions;

The material aménagement of the position of departure;

The complete smashing of the position to be attacked;

The physical and moral training of the attacking troops.

The detailed study of the two opposing positions precedes, in principle, all other operations.

As far as the position of departure is concerned, the commander of a small unit, such as a regiment or a battalion, ought not to restrict himself to consulting the frequently unreliable topographical sketch which may come into his hands; it is his duty to go through the trenches *himself*, to know their windings,

and to rectify or establish the plan of them; an exact plan is specially valuable for the reserves, in order to permit them to move rapidly and know exactly where they are coming out. His reconnaissances should not be limited to the places occupied by his own troops, or to those which are assigned to him to attack; they should be extended to the ground adjacent to him, so that he may become familiar with their topography.

The study of the position to be attacked is effected by the aviators, the infantry and the artillery in collaboration. A detailed plan is drawn up from their observations.

Usually only the aviators can obtain a general view of the position; they take photographs, which make it possible to locate on a large scale map the trenches, fortified works, and artillery emplacements; they furnish, moreover, all the information they collect each day concerning the occupation of the trenches by the enemy's troops, the state of his works, the progress of the destruction effected, and the situation of his batteries; they thus help to rectify and to complete the map which has been drawn up by means of photography, and on which abandoned trenches, unfinished earthworks, and even sham emplacements for batteries may appear.

Observations on the ground are made from the observing stations of the Command, and of the artillery. A plan of observation, drawn up in each sector, furnishes the occupants of these observing stations such information as they need, and defines their duties. The artillery observing stations are different from those intended for fire adjustment; their purpose is to seek out targets, particularly hostile batteries; but, even the observing stations for adjustment must not fail to forward any information which they may obtain.

The infantry devotes itself to a minute observation of the enemy's first lines. By means of lookouts specially chosen and placed, and of scouts and patrols, it determines the contours of his lines, and the situation of his machine guns. In order to discover certain means of defense, which were not intended to be revealed until the last moment, it makes, if need be, a sham attack, taking all possible precautions to avoid losses. It never neglects to question prisoners and deserters, and, if possible, it makes them define, on the ground, the information which they have given.

The artillery can obtain very useful information, if its observers carry out their task with unfailing attention. By virtue of their powerful and rigidly mounted telescopes, these observers often have the means and the time to render definite certain indications, which, as furnished by the airplanes and infantrymen, were a little vague.

Thus the communication and reciprocal control of the information obtained by the three arms make it possible to lay out a detailed plan of the enemy's position.

This plan, drawn up under the direction of the commander, is communicated to the leaders of the subordinate units, including, if possible, the very lowest, in order that it may come to the knowledge of all the officers.

It is accompanied by information obtained concerning the enemy's means of defense; for a difficulty that has been foreseen takes the heart out of men much less than an obstacle which reveals itself unexpectedly.

The officers should not limit themselves to the study of the plan on paper; it is their duty to visit frequently the observing stations which are assigned to them; they should go to

places whence they can most advantageously examine the terrain, carefully identify the principal points, select landmarks in the zone where they are going to operate, determine the location of fortified redoubts, batteries or machine guns which have been called to their attention, and strive to see and fix in their minds these eventual objectives, in all their different aspects. In this way they can avoid having to make geographical identifications, find directions, and consult their maps, in the midst of the preoccupation and excitement of combat.

This practical and visual knowledge of the enemy's position will have been already acquired, as a result of the observations and incidents of each succeeding day, by a body of troops which has been given the duty of attacking a position, opposite which it has been stationed for a long period; it gives it a great advantage over any other body. But it may be a very delicate matter for newly arrived troops to acquire it; this task should, therefore, be facilitated by detailed explanations furnished by the detachments which are being relieved.

Material Aménagement of the Departure Position

This has for its object to facilitate the task of the attacking troops and to enable them to continue the combat until the position is taken. To this end, it brings them as close as possible to the enemy's lines, and affords them the means of leaving the trenches and of moving forward with the minimum of loss. It provides for the installation and the rapid deplacement of the artillery which coöperates with the attack. It ensures perfect liaison between the different units, especially between the infantry and the artillery. Furthermore, it should also prepare ways of access suitable for ensuring the speedy arrival of reserves and of fresh supplies, as well as means of

exit which permit the easy evacuation of the wounded and prisoners.

This task is confided to the engineers, aided by laborers from the infantry, who have been placed at their disposal by the Command. It should be finished, in so far as possible, several days before the attack, because it is always susceptible of rectification and perfection, and because hasty labors are badly performed, and also cause the troops great fatigue.

All these preparations are carried out according to a comprehensive plan; they form the logical continuation of the work done during the period of installation and occupation, under the eye of a commander with an appreciation of his responsibilities.

The line of departure for the assault is generally brought close to the enemy's line by means of saps. The distance to be traversed by the troops ought certainly to be short, above all in open ground, where the assaulting infantry can be instantaneously caught by a barrage fire; it should, however, be long enough to permit of an artillery preparation without endangering the attacking troops. In view of these conditions, it is well to place the departure parallel about two hundred yards from the enemy's line. Its direction should be such as to place the troops face to face with the objective to be attained; it should thus run parallel, not to the first line trench, but to the line of the enemy's defense; the saps, if necessary, are thus of different lengths. The departure parallel thus obtained is a straight line trench, without traverses, which permits an instantaneous rush forward.

Since the construction of departure parallels has the disadvantage of revealing the plans of attack to the enemy, it is

sometimes better to start from the trenches themselves. In this case, steps are constructed in the trenches to allow the troops to debouch easily. If the troops debouch simultaneously from several parallels, echeloned in depth, foot bridges are thrown across the intervening trenches.

The installation of the artillery needed in the attack is effected according to the artillery plan of action; it involves the construction of important works, on account of the large number of pieces of all calibres which take part in the offensive. It is so planned as to get the most out of the batteries, the observing stations, the visual and telephonic liaisons between the batteries and the observing stations, the munition shelters, and the supply routes, and to facilitate the deplacements of all of these in view of a possible advance.

The construction of those works which are sufficiently remote from the first line need not be so rapidly pressed as elsewhere; the main thing is to hide them from the enemy's observation by camouflage. Such works become more important the nearer they approach to the first line; but camouflage, like the construction of sham batteries, is at all times an excellent means of defense. Finally, each piece of artillery may have several emplacements, in order to disconcert the enemy's observations and lessen the effects of his fire.

The ammunition depôts must have carefully chosen situations, so that the work of delivery, discharge, and evacuation may take place without congestion; they must be spread over a sufficiently large area to prevent complete destruction by airplane bombardment.

The approaches, and means of assuring the arrival of the reserves and of fresh supplies, differ in kind.

Towards the rear there are railroads, provided with all needful improvements, such as double tracking of the existing lines, laying down of new ones, creation of branches going towards important centres; they make possible the rapid transportation of the troops and of the reserves, thus facilitating secrecy and surprise; there are also roads, whose constant upkeep and enlargement make it possible for automobile convoys to move speedily and securely.

Nearer the front, there are narrow temporary ways, laid out in a direction parallel to the trenches, with branches running perpendicular to them.

Finally numerous boyaux, furnished at their entrance and at their forks with very plain sign posts, make it possible to get up as far as the departure trench.

Places d'armes for the reserves, depôts for munitions, for water, for provisions and for grenades must be made at conveniently chosen spots; command-posts, shelters, and observing stations must also be established. The *places d'armes* may be made out of trenches or shelters already in existence, or they may be specially constructed for the attack. They should be as near the first line as possible.

Exits are of the same description as approaches, but must be kept separate from them in order to avoid crossings, congestions, and blocking. Such wounded as can walk, as well as stretcher bearers carrying the severely wounded, should follow evacuation boyaux, larger than the others, on their way to the dressing stations: it is of great importance not to retard the working of the liaisons, the arrival of munitions, or the march of reserves.

The forwarding of reserves and artillery is made possible by the preparation and equipment of routes, paths, sidings, com-

mand-posts, observing stations, and emplacements for batteries; whenever possible the works, right up to the first line, should be executed in advance and finished with camouflage.

Particular attention should be paid to the installation of the telephonic, visual, and radio-telegraphic liaisons; these liaisons must be carried forward at the same time as the troops.

The importance of all of these works depends, in large measure, on the activities of the opposing front, and the counter activities planned. Like many another factor in the combat, it is determined by the information furnished to the Command.

Smashing the Enemy's Position

The smashing of the enemy's position is effected by the heavy and field artillery, aided by the trench artillery and the engineers.

Its object is to facilitate the march of the infantry. It should consequently endeavor to destroy all the obstacles that impede the latter's march, that is to say, the enemy's artillery, his defensive works, and his morale. It should likewise prevent the enemy from re-forming, or getting himself in hand.

Its activity is by no means limited to the strip of territory which contains the first trenches, but extends over the entire position, and even the succeeding ones, so as to prepare an easy, continuous, and deep advance.

The action of the artillery is carefully regulated by a plan drawn up, in the case of each large unit, by the artillery commander, in harmony with the main plan of action of the general commanding the unit. This plan determines the groups of the pieces, chooses their emplacements and fields of fire, assigns their tasks, organizes their liaisons, ensures their supply, and arranges for their deplacement.

The destruction of the enemy's artillery, or, at least, its neutralization at the moment of the attack, is only made possible by the efforts of careful observers on the ground and in the air. It can only be accomplished when the aim is perfect, and when the pieces are abundantly supplied with ammunition. A plan of the enemy's batteries should always be accessible at each headquarters. Continual observation is, moreover, needed to adjust the fire when it has ceased to be accurate.

Only the heavy artillery is capable of producing sufficient effect to permit the infantry to go forward to the attack, when the enemy has had time to perfect his organization in advance. It alone can secure results against the deep and buttressed shelters by which the infantry is protected, and against shelters for machine guns, against fortified villages and hamlets containing deep vaulted and fortified cellars, against heavy batteries and even sometimes against first line defenses. Long range guns make trouble in the rear of the enemy's lines by firing on his supply convoys, on his reliefs, on his works, and on his lines of communication.

Field artillery is chiefly employed to destroy barbed wire entanglements or other obstacles, and to compel the defenders of the position to dig themselves in. It is also used against field batteries. Finally it is always ready to start a barrage fire in opposition to the enemy's efforts to disturb the preparations for the attack.

Trench artillery is used against men and against matériel. It supplements to good advantage the effects obtained by the heavy and the field artillery on those points which lie within its range. It can be given the task of smashing the first line trench all by itself, in case the fire of the other kinds of artil-

lery is difficult to adjust upon this target, or is dangerous for the assaulting troops.

The emplacements of this trench artillery of different calibres are arranged one behind the other. Part of them ought to be placed near the first line, in order to diminish the amount of moving forward that has to be accomplished during the advance; but they should not be accumulated in narrow areas, for fear of being neutralized by the enemy's guns, and especially by asphyxiating shells. Their emplacements are selected with a view to the tasks assigned to the different pieces and to their special qualities and characteristics, as well as to the topography of the position.

The zones of action are normal or eventual; the normal ones are side by side, the eventual ones overlap. When a target is signaled, fire is opened by the group of guns in whose normal zone of action the target lies; if this group experiences difficulties in hitting the mark, it asks some other group, in whose eventual zone of action the target lies, to open fire. Thus there is never such a duplication of fire as to interfere with the adjustment; but duplication does occur when a concentration of fire is called for.

Observers are either in the air or on the ground.

Aërial observers are placed in airplanes or balloons. Their duties vary. Sometimes they are detailed to furnish information to the Command about the organization and works of a sector of the enemy's line, sometimes to watch the activity of the troops in a sector, sometimes to maintain liaison between the artillery and the other arms, or to adjust the artillery fire.

The airplanes generally communicate with the ground by means of wireless telegraphy; they also use wireless telephones, projectors, weighted messages, and rockets. By means of

the Morse code, the observer is able to make himself known to the receiving station, to furnish information about the troops of either side, to point out objectives, and to indicate errors of fire. At the receiving station are an artillery officer and a wireless officer who forward this information to its destination. On the other hand the receiving station can give the observer simple messages about the conduct of the fire, by the aid of squares of white cloth or projectors.

Balloons communicate with the ground by telephone. On the ground, if there is no telephonic communication with the command-posts and with the artillery groups, these liaisons are maintained by a wireless post. In practice it is hard for balloons to rise above 1600 yards, and often they cannot go as high on account of the wind. They must remain half a dozen miles from the enemy, owing to their vulnerability.

Observers on the ground are placed in carefully chosen observing stations; they must always be on the watch, even in sectors which appear to be quiet; at times they have to fill the place of the aërial observers, who cannot go out in every kind of weather. Some observing stations are intended to furnish information, and so have a wide outlook; others are used for fire adjustment for specified artillery battalions or batteries, and can consequently ensure their rapid action and effective use.

The aviators have an important rôle.

The airplanes and the balloons not only furnish the Command with all the information possible concerning the enemy's position, but also adjust the fire of the artillery. The air must not be encumbered with so many planes that they hinder one another, nor must too long a time be spent in the process of adjustment; for these reasons, the aviators operate in accord-

ance with a methodical program, and are only expected to collect information unobtainable by observers on the ground.

The use of airplanes with projectors, and of those carrying weighted messages, makes it possible to increase the number of planes operating at once; if too many of them used wireless it would cause confusion in the messages.

In addition, the airplanes have the task of blinding the enemy, by preventing his aërial fleet from crossing the lines, from taking observations for the adjustment of his fire, and from obtaining uninterrupted opportunities of reconnoitering. The destruction of the enemy's planes and balloons has the double result of preventing information from reaching the enemy, and of limiting the action of his artillery.

The smashing up of the enemy's position is as carefully executed as it has been thoroughly prepared.

Batteries of different calibres fulfill the special functions which have been assigned to them. Heavy artillery of the long-range type fires on points where the troops pass and concentrate in the rear, on the principal roads and crossroads; heavy artillery of great power destroys strongly organized points of support; ordinary heavy batteries demolish the trenches and their different shelters; field batteries destroy the accessory defenses, and execute barrage fires. Batteries of all calibres are used to oppose the fire of the enemy's artillery.

Thus, while fresh supplies of men, munitions, and provisions are held back by an impassable barrage, the position to be attacked is smashed from top to bottom, without any respite; and the artillery which defends it is taken under fire the moment it reveals itself.

The general progress of this smashing is attentively followed by the airplanes which take daily photographs. They themselves participate in the operations by going to bombard stations, road forks, concentrations, headquarters, and all other suitable objectives.

All possible means are employed to determine the effects of the bombardment of the first line; the reserves of the different arms pay special attention to it, and patrolling parties go as far as possible at night to ascertain the results secured. Sham attacks are even made, in order to make certain whether any machine guns or undiscovered flanking positions remain intact.

The engineers contribute to the destruction of the enemy's position by the use of mines and countermines; they aim to blow up important flanking positions, and to throw disorder among the adversary's troops.

The carrying out of the smashing process ought to give to the attacking troops entire confidence in their success. The leaders of these troops have the right and the duty of indicating to the commanding officer those points on the first line where they judge the artillery preparation to have been insufficient; in such a case, observation officers of the artillery in immediate liaison with the infantry officers concerned devote themselves to obtaining the desired results. The utilization of this method of procedure relieves the troops intended for the assault of any apprehension which might militate against their spirit and dash.

The physical, professional, and moral training of the troops is the work of leaders of all ranks.

During the days which precede the attack the troops take turns in resting behind the front, in order to shake off the

sluggishness engendered by life in the trenches. At this moment, the commanders of the small units make it their business to continue and improve, in the most diverting possible ways, the physical training previously acquired.

Instruction is the surest means of giving the troops the best chances of success; it should be the constant preoccupation of the commanders during periods of rest, in such wise that it should suffice to recall to the men certain basic principles on the eve of the attack, in order to be certain that they will give a good account of themselves. And instruction is not only the surest road to victory, but also the surest means of avoiding the useless sacrifice of countless lives. Troops that have been well taught attain success with a minimum of losses.

The moral preparation is a work of long duration, and consists in cultivating in the officer and in the soldier military virtues and lofty sentiments. If this preparation has been carefully made since the beginning of the war, it bears fruit during a whole campaign. It remains a permanent possession of certain corps, in spite of the new men who come in, for it is passed on as a precious heritage to the recent arrivals, through the almost unconscious intermediary of those who have survived. In these corps, an intimate camaraderie, which does not in the least prevent strict discipline, unites all the combatants from the commander down to the humblest soldier.

Such are the feelings which must be stimulated before combat. On all sorts of different occasions, the officers and N. C. Os. should inflame their men with the love of their country and the resolve to uphold the honor of the flag; they should affirm the certainty of victory, so as to inspire their troops with the necessary confidence and to endow their ranks with irresistible élan.

CHAPTER III

ATTACK

Attack is the essential feature of combat. It may last several days, or even several weeks.

The choice of the moment of attack is in the hands of the Command. It depends on the results of the artillery preparation, as determined by all the means of observation, including the patrols; on the state of the weather, since rain is a great hindrance; on the clearness of the air, which should be such as to permit a proper adjustment of artillery fire.

The object of the attack is to seize the enemy's position and hold it solidly, in order to permit an immediate or subsequent continuation of the advance.

This rôle is assigned to the infantry, aided by the fire of the artillery, the labors of the engineers, and the aërial observations.

It consists in seizing the first line of trenches, and then the succeeding lines, so as to reach the line of the enemy's artillery as soon as possible; in reducing such centres or works as may resist; in pushing forward to the limits of the position, and organizing them against a *retour offensif;* and finally, in taking the preliminary steps for a continuation of the movement, never losing contact with the enemy.

Just as in an offensive combat, which aims to capture successive positions, the different phases should follow one another rapidly, so in an attack on a position, the assaults on the successive objectives should take place without delay, in order

that the enemy may have no time to re-form. The landmark assigned to each unit to guide its march should be chosen beyond the final objective to be taken, in order to make certain that the reconnaissance of the next position will be carried out.

But it is the duty of the Command alone to provide such measures and give such orders as are necessary for the attack on the succeeding position.

The formations adopted for the attacking units are of great importance for the proper progress of these units, and, consequently, for the success of the operation.

The first troops advance in waves. A wave is formed by the infantrymen of one rank simultaneously leaving the departure parallel. The various units in lateral contact are each one echeloned in depth, in such wise that a battalion can have its four companies divided into four successive waves, or that each company can be divided into two successive waves.

This formation enables the leader to command his unit more easily, and to manoeuver therewith, if necessary, from the very start, which would be quite impossible if it were drawn up in one line; it thus gives to the wave an articulation and a flexibility which it would be far from possessing, did it consist in a single deployed unit.

Since the various waves must follow one another rapidly, it is important to bring them as near as possible to the departure parallel. This arrangement has the advantage of permitting them to escape the barrages delivered by the enemy as soon as the attack is started; the successive waves take their distances at the time of departure or during the advance. All such concentrations must naturally be effected with caution, so as to conceal them from the observation and fire of the enemy; it is also essential to avoid piling up units in places

where they have no shelter, or in boyaux which should remain unencumbered; a well-conducted bombardment might cause considerable losses and disorder among the troops, thus seriously injuring their morale for the assault. Previous reconnaissance by the officers, perfect liaison between front and rear, order, silence, and rapidity of movement, greatly facilitate this disposition of the successive units for the start.

Before the attack, the commander contents himself with recalling to all his subordinates the precise task of the unit, and its specific objective. Task and objective are the same for all fractions of the unit, since it is echeloned in depth; and this again is one of the great advantages of the formation adopted.

The artillery observers accompanying the infantry, as well as the details of engineers assigned to the attacking units, take their places with the troops to which they are attached; they never start with the first wave, even though they may have been directed to join it subsequently.

The mechanism of march and of combat for the first waves cannot be determined by any fixed rules, for it depends upon circumstances and upon the terrain. Still, there are certain principles which should be observed, and certain methods which should be adopted.

The word **waves,** which calls up the picture of billows of the sea breaking in foam upon the rocks, might give rise to very false ideas, were it not explained. The simile is good at the moment of departure; it still holds when the waves, encountering an isolated obstacle, overrun it on either flank; it ceases to hold when the waves break successively against an insurmountable barrier.

A wave should be considered as an echelon suitable for the march; it is not, properly speaking, a disposition for combat.

The first wave alone can carry on the fight effectively. The object of the others is to ensure the continuity of the movement, by completing the work of cleaning up the terrain, by reinforcing or relieving the first, and by making possible manoeuvers intended to protect a menaced element or to overcome an unforeseen obstacle.

The succeeding waves should never be hurled against obstacles which the first wave has been unable to overcome. Obstacles of this sort are vanquished with matériel and not with men.

The mechanism of march and of combat, resulting from the principles which we have laid down, must now be explained in detail.

The first wave leaves the departure parallel at a prearranged moment, or at a given signal. Every platoon has its different specialists — riflemen, automatic riflemen, grenadiers, etc. — arranged in several lines, in conformity with the orders given; but these lines, though they are sometimes called "waves," by an extension of the meaning of the whole to the different parts that compose it, tend generally to merge into one another after a short time; it is therefore rather the sum total of them that constitutes the assaulting wave or line of combat.

The first wave should move forth without hesitation and without a moment's delay; for at this very instant the artillery, which is holding the enemy's first trench under its fire, deepens its aim, thus enabling the defenders, if they grasp the situation in time, to come out from their shelters and man the parapet. It advances at a walk, silently, in line, and without shooting, straight on the first line trench; it crosses this trench without halting, while men, designated in advance

for this purpose, take possession of it, exploring the shelters and cleaning it up. It then goes on to the second trench.

The first wave or line of combat advances at a pace which has been determined beforehand in accordance with the difficulties of the terrain and the information received concerning the enemy. The artillery opens a barrage fire in front of it, which advances at the same pace as does the infantry. In this fashion the line of combat is protected at every moment by a deluge of shells which opens the way.

The liaison between the infantry and artillery is principally effected by a prearranged time schedule. If an unexpected halt occurs in the line of combat, and the artillery has not been notified of it by some method of liaison, the barrage will continue to advance and leave the line of combat to its own resources. These resources should be increased as far as possible, as for example, by having the line of combat preceded or accompanied by tanks.

When it is absolutely impossible to advance without incurring certain losses, the fault lies in the insufficiency of the artillery preparation. In such cases the duty of the commander is to avoid useless effusion of blood, and to obtain an artillery preparation that is more complete.

If, on the other hand, losses are caused by the normal incidents of an attack against a tenacious adversary, the line of combat ought to go ahead on its own resources. It cannot expect the artillery to clear the ground of all the enemy, and it should be willing to accept the sacrifices which are inevitable in every war. In case it has been compelled by the enemy's fire to halt before the first trench, its rifles, its French automatic rifles, and its rifle grenades are used to gain ground; then, when it has arrived within a suitable distance, hand

grenades are thrown, and the men rush to the assault with the bayonet.

The second wave should follow the movement of the first at a short distance. It usually starts at the very moment when its predecessor has reached the enemy's line, in order to avoid congestion, disorder, or loss, in case of a hitch at the start. Its duty is to aid, support, and reinforce the fighting wave. It ascertains, on arrival at the first trench, whether the trench cleaners are sufficient for their task, and comes to their aid if need be. It also includes men entrusted with cleaning up the second trench and the boyaux.

It is essential to make sure that the first wave be not fired into from behind, as that would oblige the men to turn about and deal with the enemy in their rear. Likewise is it essential that no prisoners be left near the line of combat, as they might resume the fight at the first opportunity.

The second wave is accompanied by machine guns intended to secure the retention of the conquered terrain by seizing favorable positions from which to fire.

The succeeding waves are set in motion on the order of their commanders, who have been told how to dispose them so as to accomplish their assigned tasks. They are echeloned so as to provide reinforcements or reliefs when needed, and to ensure the occupation and retention of specified objectives.

In consequence of the barrage fire usually delivered by the enemy, these waves march in lines of small columns. This formation is advantageous not only for the purpose of avoiding losses, but also for that of controlling the troops, and for keeping in place any men who might be tempted to stop in the trenches which they are crossing.

A wave is not a tactical unit. Moreover, it is of very variable size, according to circumstances; for the Command may judge it wise not to launch the attack on all parts of the front at once. It has not, strictly speaking, an objective; a trench, especially a trench in the interior of a position, is not properly an objective—first, because no one can describe it exactly nor even see it in advance; second, because it is a mere line of uncertain direction and ill-defined lateral limits. An objective is a tactical point towards which the efforts of the unit converge, and whose occupation is a step towards the conquest of the position. It is rather the units constituting the elements of the successive waves which have objectives; these consist sometimes merely in intermediate landmarks, but they always lead to the well-defined objective, which has been fixed beforehand by the Command.

It is however indispensable that each wave should maintain its own lateral cohesion, for fear of splitting up into little individual groups, threatened with failure and destruction. This cohesion is effected by perfect lateral liaison between the different elements of the contiguous units. Each wave must also have a sufficient number of officers to watch it, and regulate its march. If all the contiguous units were arranged according to the same plan, all the majors, for example, would be in one wave, all the captains in one, and so on. It is thus incumbent on the Command so to distribute the leaders of units, that there shall be with each wave officers capable of making a decision, of giving an order, of assuming responsibility, of drawing up a report or of meeting an unexpected situation.

When it happens that the first wave in its advance has sustained too great losses to be able to maintain its effort

without help, then the second wave must reinforce it and weld the two into one.

It is to be noticed that, in the course of the attack, the first waves cannot, usually, maintain their initial rigidity; at some points the enemy will resist more stoutly, owing to an insufficient destruction of his works by the artillery; while at other points the waves will sweep on, almost without effort and without loss. When reinforced, the units of the first line which have suffered least can extend their front, by means of their lateral liaison, and avoid offering too dense a formation to the enemy's fire.

The reinforcement of the fighting wave by the succeeding ones is effected, when it is needed, by means of the liaison from the rear to the front. When one part of the attacking line has sustained loss, the reserves of the corresponding units are sent thither. It should be noticed that these reserves are intended to execute some manoeuver which shall serve to make the obstacle fall, not to renew fruitless and bloody assaults.

It is the duty of the commanders to see to it that this reinforcement takes place at the opportune moment, and that the succeeding waves are not mixed in automatically with the first wave, nor piled up at a short distance behind it; these mistakes would expose the troops to needless losses, deprive them of the use of reinforcements at the critical moment, and create between the attacking line and its reserves a gap prejudicial to the favorable development of the combat.

In spite of all, there will arise various modifications in the composition of the waves, regardless of the officers. In the crisis of the fight, the most ardent groups, led away by their enthusiasm, will be found in the midst of the first wave, while others, delayed by one pretext or another, will mix in with the following ones.

For this reason it is well to have in each company, battalion, or regiment a detail of police, commanded by an energetic leader marching with the last wave of the unit; its object is to pick up isolated men and stragglers, and to send them back to their places. Indeed this is one of the important advantages of the echelonment in depth; the men, knowing that they are followed by officers, non-commissioned officers, and comrades of their unit, are restrained from lagging behind, both by self-respect and by fear of reproach; if they do lag, they are put back where they belong.

On the other hand, there is no harm in giving free rein to that natural selection which places in the line of combat the bravest elements of the first waves; provided, of course, that this can occur without disorder, by the natural play of circumstances, or, so to speak, automatically; it helps to put dash into the first wave, and to pull the unit along by the example of its bravest. All the elements echeloned in depth are on fire to join those at the post of honor.

The struggle inside the position serves to break up the waves, to a considerable degree, since it may involve the most diverse sorts of incidents.

The first task of the assailants is to clean up the conquered trenches. In each wave certain details, specially organized in advance, are charged with this; the chosen men are armed with grenades, revolvers, and knives, for in a narrow trench it is extremely difficult to handle a bayonet. It is often simpler than one would suppose to clean up a trench; if the enemy has been able to man the débris of his trench, he is demoralized by the arrival of the waves and the storm of grenades, and resists but feebly; if he has burrowed into his shelters under the stunning influence of terrific artillery fire, he is even more

likely to beg for quarter; in either case an immediate and energetic suppression of any hint of resistance has a salutary effect on the occupants. Their task once done, the cleaners do not stop in the trench; they go on to the next one to aid their comrades, progressing thus, step by step, towards rejoining their unit.

At certain points where the enemy's defensive works have been spared by the bombardment, some elements of the waves will meet a resistance which they cannot overcome. The commanders of the units which are stopped in this way call into play the rifle grenade, the portable cannon, and other accompanying machines such as tanks; if the results obtained with these are insufficient, they wait before advancing, either for artillery preparation, or for the adjacent units to reach the flanks of the obstacle, or for some manoeuver by the reserves. They avoid any useless sacrifice of their men.

An incident of this sort must never be allowed to retard the advance as a whole. It is by the continuity of their progress that the attacking troops prevent the enemy from rallying on the position.

Machine guns accompany the first waves; they sweep the intervals which the accidents of the advance, or the separation of the objectives, have left unoccupied; in this way they protect the flanks of the elements of the waves; they halt by their fire any *retour offensif*, or counter-attack; they throw the retreating troops into disorder, and can sometimes inflict serious losses on them.

Behind the battalions which constitute the first waves, and which feed the line of attack, march those other battalions which constitute the brigade and divisional reserves. These

are intended eventually to reinforce the fighting wave by sandwiching themselves into its gaps, by manoeuvering against nuclei of resistance, by holding up counter-attacks, and by providing total or partial reliefs. They learn what is expected of them from the commander at whose disposal they have been placed.

Large reserve units, such as brigades and divisions, can relieve, during the progress of the fight, those units which have been engaged since the beginning of it, in case the latter have been too sorely tried by losses or by weariness. In such cases the relieving units pass on beyond those relieved. To permit this, the first units engaged halt on a line that has been agreed upon, give the new units all possible information in regard to the enemy and the ground, and let them go forward. They then get a chance to re-form and may in turn become reserves.

In the course of this fight for a position, the artillery never ceases to help the infantry by its fire.

Its essential task is to counteract the fire of the enemy's artillery when the latter is delivering barrages against the waves, either to prevent egress from the departure parallel, or to hinder the further advance. Even though the artillery may doubt its ability to destroy the enemy's batteries, it can often silence them momentarily, and thereby give the infantry an enormous advantage.

The barrage which precedes the infantry continues to advance in the interior of the position, in accordance with a prearranged time-schedule. This time-schedule should be slow, so as to enable the infantry to follow the shells without difficulty. The barrage cannot, as a matter of fact, be brought back, on account of the dangers involved; and it should

not advance too fast, for fear of leaving the infantry without immediate protection. Its aim should be constantly to prevent the enemy's riflemen and machine gunners from firing.

In order that there may be complete accord between the advance of the barrage and that of the infantry, numerous preliminary exercises should be held, in order to enable the two arms to familiarize themselves with one another. In case they get out of touch in the course of the combat, the infantry should be able to make signals to ask for (1) an advance of the barrage, (2) an increase of its intensity, (3) its maintenance on the same point beyond the allotted time.

It is impossible to foresee everything that may occur in the interior of a position. The troops are not confronted with clearly-marked trenches, such as furnish comparatively easy targets for the artillery; they have to traverse a chaotic region which the shell-holes formed by the artillery preparation cause to resemble a bit of the surface of the moon. The enemy is at once nowhere and everywhere: a single machine gun in a shell-hole can hold up one or two battalions. There is no clearly defined target for the artillery.

The plan of action, then, can do no more than provide for a halting of the advance of the barrage on known lines of resistance. Every such halting permits the infantry to re-form, to be reinforced, or if necessary to be relieved by another unit advancing beyond it.

Over and above this duty of directly supporting the infantry, the artillery has other more general tasks. It delivers barrages against the enemy's reinforcements, his counter-attacks, and his reserves; it does not hesitate to take under its fire any concentrations of this sort which are pointed out to it, in order to disorganize them at the start. It fires on the routes

of access to the zone that is being attacked, and it maintains a protecting barrage on its flanks. In this way it isolates the various adversaries with which the infantry is at grips.

In these operations the scouting, observing, and fire-adjusting airplanes render great services to the batteries engaged.

The artillery may also, when the infantry asks for it, support the latter's attacks against nuclei of resistance. Under these circumstances it must obtain all possible information and take every precaution necessary to the success of this operation which is sometimes extremely delicate. The infantry is particularly likely to be demoralized by the least error on the part of its artillery; in case of doubt, it is better to let the foot soldiers get along as best they may with such accompanying pieces as have been allotted to them.

When, on the other hand, the enemy resists in a well-defined section of the line, or in a sharply delimited centre, the batteries may effect a concentration of their fire, which constitutes, from the tactical point of view, a real manoeuver; the projectiles of the artillery will often afford more helpful aid than infantry reserves.

This intervention presupposes that the distribution of the artillery among the various sectors, which was adopted during the period of stationary fighting and preparation, has been abandoned at the beginning of the combat, in order to leave the various artillery units in the hands of those leaders to whom they regularly belong. The commander of a first line division can thus concentrate his shells more easily than his foot soldiers on that part of the battle field where he judges they will be of most use; to this effect the artillery commander assembles groups of batteries of heavy or field artillery, to

which clearly defined tasks are assigned. Some of these groups are placed at the disposal of the brigade or regimental commanders, to enable them to overcome any difficulties which they may encounter.

Artillery reserves are constituted by artillery units which have been temporarily taken away from troops who are not engaged, or else are located in the quieter sectors. They are placed far in the rear and intervene at the order of the Command, either as a manoeuvring body to attain a particular end, or else as a relief to replace exhausted units.

Finally, if the attacking troops push forward, the batteries move on, in order to continue their support. This movement, which is always dangerous, should only be executed when it serves a purpose. As far as possible it should take place during the night. It is carried out according to some well defined plan by echelons, in such wise as not to break the continuity of the fire. In order that there be no delay, emplacements for the pieces must be sought out beforehand; moreover, the matériel and gangs of workmen must be in readiness to effect the complete installation of the pieces.

No matter what care has been given to planning the advance of the barrage, no matter how carefully and continuously the supporting artillery performs its deplacements, the infantry will often inevitably be confronted with obstacles which it must overcome by its own resources. For this reason it must be furnished with every weapon which can facilitate its advance. Success in the interior of the position may come from the use of cannon, light enough to accompany the infantry, yet powerful enough to overcome obstacles. In any case the infantry is greatly aided by skillful utilization of the weapons which can be handled by the foot soldier; the rifle

grenade, hand grenade, French automatic rifle, and machine gun.

Night fighting is the natural continuation of fighting by day; its object is to consolidate and complete results already obtained.

Night permits the organization and fortification of the conquered terrain, the reconstitution or relief of the units engaged, the supply both of munitions and provisions, and the preparation, by local progress or partial actions, for the resumption of the movement at daybreak.

Troops can only continue their general advance during the night if they already know the terrain on which they are operating, or if the enemy is demoralized; otherwise, they run the risk of making costly mistakes, or of falling into murderous ambushes.

The liaisons are maintained even more closely than during the day. Every movement of one unit must be communicated to the neighboring ones.

Night fighting is not generally speaking adapted to an advance on a wide front or to a great depth; it does, however, permit of small operations called raids, which can be of considerable importance for the continuation of that advance.

These raids are executed by platoons, companies or battalions, and aim at such objects as the taking of a trench, the occupation of a group of houses, the seizing of a post, or the enveloping of a nucleus of resistance. An important element of success is surprise, which is harder to achieve than during stationary periods; still it is during the night that the enemy tries to reconstitute his forces, to carry out the relief of his exhausted troops, to fortify the positions to which he has been

driven back, all of which are sources of momentary weakness and inattention.

The observers and patrols observe the slightest symptoms indicating a relaxation of the enemy's guard or watchfulness. At a signal given by their leader, the troops attempting the raid steal forward in perfect order and absolute silence; on reaching the enemy's entrenchments, they leap in with grenade, revolver, and knife. The men are, for the most part, unencumbered with knapsacks, guns, or bayonets, so as to increase their freedom of action and agility; those among them who are ordered to retain their equipment take the greatest pains to avoid all clicking of their arms during the march. The conquered entrenchment is at once reversed, organized, and connected with the place of departure; the arms and knapsacks of the grenadiers are brought up by a reinforcement.

The artillery cannot bear effective aid in night operations; it limits itself, before the arrival of darkness, to finding the ranges of the points held by the enemy, or of dangerous outlets, so as to be able, at the call of the infantry, to let loose a barrage to prevent a *retour offensif*, or counter-attack. The heavy artillery adjusts its fire for the night on the crossroads or ways of approach used by the troops and the supply columns, in order to cannonade them.

The artillery takes advantage of night time to alter its position with some measure of security, to move to those emplacements which have been located during the day; to organize its observing stations, and its telephone lines. The airplanes and the dirigibles have the task of bombarding important railway stations and lines, cantonments and bivouacs of the

reserves, storehouses, workshops and artillery parks behind the first line.

The attacking troops are required, even if they do not judge it wise to try raids, on no account to lose contact with the enemy, and to watch his every movement. This surveillance will sometimes enable them to occupy without loss points which for the moment are weakly held; it reveals the enemy's retreat, if that takes place, and furnishes useful information for the resumption of the advance.

Orders, reports, and liaisons are of extreme importance during the combat.

Orders, which are the decisions of the commander, should contain everything that it is necessary for the subordinate officer to know, but nothing more.

A commander, in giving his orders, should not leave to his subordinate the duty of prescribing the measures for which he himself should be responsible; on the other hand he ought not to limit his subordinate's initiative by prescribing to him details of execution.

All orders in regard to operations should include:

1. Information about the enemy.
2. The intention of the commander who gives the order and the ends which he is aiming to accomplish.
3. The objectives to be attained, and the movements to be executed by the unit to whose leader the order is given.
4. The place where the commander can be found.
5. The movements of the neighboring units.

An order should be perfectly clear, precise, and complete; it should contain nothing vague. Indefinite expressions such as

"daybreak," "night time" should never be used; and it is better if possible to say "north, east, south, west," than "to the front, to the rear, to the right, to the left." It is often very important to state what particular map has been utilized for drawing up the order. For times of the day and night the hours and minutes should be given. The French number the hours from 1 to 24.

Save in cases of special urgency, the transmission of orders should go down the scale of authority without omitting any intermediate rank. In case an intermediate officer of any grade has to be omitted, the commander who gives the order informs him, and the junior officer who receives the order communicates it at once to his superior.

Specially important orders are carried by officers. Every man who carries a written order or a report ought to be prepared to get rid of it safely at a moment's notice.

Orders relative to the general purpose to be fulfilled, the successive objectives to be reached, and the principal dispositions to be made, are communicated before the action, not merely to the first attacking units, and their brigade and divisional reserves, but also to all troops who have any chance of taking part in the combat.

Secrecy, so indispensable during the period of preparation, should be abandoned on the eve of action, for at the last instant, when departure is imminent, the units cannot assimilate the idea of the sort of effort in which they are going to participate. Troops who have arrived after hasty transportation or marching, frequently at night, on an unfamiliar terrain, face to face with obstacles which they cannot see, and without adequate information as to the situation, are unquestionably placed at a disadvantage for purposes of taking part in com-

bat. On the contrary they are well prepared for their work if they have been fully instructed before the beginning of the action, kept in touch with the march of events, and have clearly faced the tasks which await them.

Orders become simpler and simpler as one goes down the scale of authority. Nevertheless, they should, as far as possible, be given in writing, even in the case of a small unit such as a battalion or company, and they should be few in number, in order to avoid hesitation, delay, and error.

Reports should contain precise information in regard to the place, date, and hour at which the events set forth occurred.

A report should always give the name and assigned task of the sender, and those of the person to whom it is sent; also the day and hour at which it is sent. The man who draws it up should also always distinguish between what he has seen himself, and what has been reported to him by others, by indicating the sources of his information. A good way to remember the order in which information should be given is by the formula, "Who, When, Where, How, What."

Who refers to the effectives, the regimental numbers, etc., of the enemy.

When indicates the exact moment when the observation reported was made.

Where indicates the place occupied by the enemy's troops.

How refers to his situation and movements.

What indicates the intentions of the officer sending the report.

It must always be borne in mind that the report should reach the commander in such a condition that it can be read, and all the necessary precautions must be taken to secure this.

Reports should be frequent during the combat. Too much care cannot be given to explaining and checking up the information which they contain, for they constitute important elements for a decision on the part of the commander.

Liaisons during the attack are of fundamental importance.

Each commander of a unit, when he executes a forward movement, chooses an observation post, close to which he places his command-post.

Observing stations for information and for the artillery should be established in suitable places during the course of the advance; they should make it possible to follow the march of the combat and to watch the signals made by the attacking line.

Observations from airplanes and balloons afford a particularly advantageous means of establishing good liaisons, and of enabling the Command to obtain exact information. Photographs make it possible to become acquainted with the situation in any particular zone, and in particular, to learn the effects which have been produced by the artillery.

Airplanes have various duties. Some accompany the infantry, never losing sight of the attacking line, but communicating with it, and watching the enemy opposite; these are the *accompanying planes.* Others, called *command planes,* observe the enemy in a particular sector and inform the Command of his situation, his concentrations, and his movements. A third category, called *messenger planes,* establishes the liaison between the Command and the corresponding units by transmitting orders and information.

Balloons fulfill functions of the same general sort. They do not confine themselves to artillery adjustment, but also

observe the attacking line and transmit signals (*infantry balloons*). Others, generally one for each army corps, follow the progress of the combat for the information of the Command (*command balloons*).

The liaisons between the air service and the troops are effected in the following manner:

The infantry communicates by signals with the accompanying planes. In front, the attacking line indicates its position by Bengal lights, signalling cloths, called *panneaux de jalonnement* which are opened out on the ground, projectors, mirrors, and all sorts of means. These signals are made along lines determined in advance, either at the request of the airplanes, or on the initiative of the company commanders. All other troops, save those of the attacking line, are forbidden to make signals, so as to avoid confusion. Behind the attacking line the command-posts for battalions, regiments, or larger units, communicate with the planes or balloons. They use cloths bearing special marks and spread out on the ground to indicate their location; they also use cloths or projectors for messages.

Accompanying planes never fly at a greater height than 4000 feet, and carry distinctive marks which should be familiar to all who coöperate with them. The observer communicates with the infantry by means of signal cartridges, after he has revealed his identity by an audible signal or identifying cartridge. He receives signals from the infantry and notes its position. He transmits urgent information by wireless, while other less pressing matter is sent by weighted messages; these latter convey all his observations relative to the disposal of the line of attack and the command-posts, on sketches prepared in advance.

The infantry balloons (generally one to each division) carry distinctive marks. They receive signals from the attacking line or the command-posts, but reply only by very simple signals, such as "Understood" or "Repeat," preceded by the *indicative* of the receiver. They may even remain in the air during the night. They communicate with the ground by telephone. Thence the messages are forwarded to their destination by telephone, or, in exceptional cases where telephone lines have not been run, by wireless.

During the course of the advance, the rapid establishment or repairing of telephone lines is of great importance. These operations are much easier if the telephone system of the departure position has been established with care, and if the forward movement has been arranged beforehand; the plan of the telephone system to be eventually constructed should be studied, the work thereon pushed as far as possible, and the necessary workmen held in readiness. All the supplementary means of liaison must also be planned out.

As a means of avoiding all errors, the use of other signals or other means of communication than those determined on by the Commander-in-Chief should be absolutely prohibited; signals must be exactly the same along the whole front.

The liaison of the attacking troops with the artillery is primarily intended to show the latter the exact location of the infantry at each instant, and, whenever possible, its tactical situation, its purpose, and its needs. In this way it doubles the liaison with the Command and avoids delays, for the artillery must be quickly informed, not only when to fire, but also when not to fire, or to lengthen the range.

This liaison does not give the commanders of waves or small units any right to open with their artillery at their own dis-

cretion; it rather gives them a guarantee against errors of range or misunderstandings, and a means of pointing out those objectives which cannot be overcome without the aid of guns. The divisional commander, assisted by his artillery officer, is responsible for using the batteries for the greatest good of all; he distributes them in tactical groups proportioned to their assigned tasks; he may, however, put a certain number of batteries at the disposal of the brigade or regimental commanders.

The means of liaison are the usual ones, runners and telephones; at the same time it is more practical to use rockets or visible signals, on account of their instantaneous action, when it is necessary to indicate the presence of friendly troops at a certain point, to ask for the cessation or lengthening of the fire, or for a barrage to stop a counter-attack.

It is precisely under special circumstances such as these that the commanders of artillery battalions or of batteries may exercise their discretion, provided the measures adopted are not inconsistent with the general plan, and are reported immediately to their superior officers.

The aircraft, airplanes, and balloons render important services to this liaison. They follow the troops in their advance, always remaining in the zone of the division to which they are attached. Airplanes communicate with one of the centres of information by projectors on board, by rockets, and weighted messages; this centre of information is close to the divisional command-post. It is moved forward in conformity with the advance of the troops, and the command-post moves along with it. It communicates by all the means at its disposal with the aviation field behind the original point of departure for the attack. But a landing ground should always

be sought for in the immediate vicinity, in order that the airmen may come and be told precisely what their tasks and their objectives are, and learn what information has been obtained.

The forwarding of reserves, munitions, and food during the attack is one of the constant cares of the Command; if there is to be continuity in the forward movement, there must be continuity of supply. If the reserves do not arrive at the right moment, if the ammunition gives out, even momentarily, or if the food is lacking, success is endangered.

This forwarding involves two aspects, a tactical one, since it is ordered by the Command; and a practical one, since it is greatly accelerated by special material preparations.

In order that the Command may issue its orders, it is essential that it be exactly informed as to the situation of the troops, their progress, the results which have been accomplished, and those which are to be expected. Thanks to precise and frequent reports, the commander is able to make his decision in complete knowledge of the facts, to know at what moment to call up his reserves and to what point to direct them, and to see whether they will suffice to carry out the purpose he has in view.

In order that there may be no hitch when it comes to the actual execution of the orders, it is essential that the *aménagement* of the departure position should be carried out with diligence and foresight during the period of preparation for the attack, and that no means of access or evacuation be overlooked.

The most rapid and certain means of access from behind the lines are railways; the Command should not hesitate to double or treble them, to multiply their ramifications, or add

to them branches leading towards the front. As for the roads whose utilization is no less severe on account of the circulation of automobile trains, their maintenance is constantly ensured by special gangs of men. Strict orders must be issued to clear these roads during the combat, in order to reserve them for supply work of all sorts. Similarly, near the front, the narrow temporary roads and boyaux are strictly supervised so as to avoid all loss of time in the process of forwarding.

Depôts for munitions and food are utilized as turnouts or halting places. They permit the reserves to be brought near to the line without piling them up, and make possible the accumulation of ammunition and food near the firing line. In the *places d'armes* or other fixed points, the reserves should find guides sent back by the troops whom they are going to support.

Evacuation routes present the great advantage that they make it possible to avoid passing and congestion, which are fatal to free circulation. When they do not exist, or are not sufficiently numerous, it must be an absolute rule that supply takes precedence over evacuation.

The organization of the conquered position is, in principle, the work of the engineers, who follow close on the first waves.

When the enemy's first line trench has been occupied, it is joined to the departure parallel by boyaux, permitting it to be approached under cover, and making it into a new trench.

Without waiting for the termination of this work, which is, at times, fairly protracted, the succeeding trenches are cleared and reversed as rapidly as they are occupied.

The object of all this is primarily to facilitate the progress of the reinforcing or relieving units and of the reserves, by

improving the more difficult passages, both with a view to their security and to rapidity of movement. Another object is to ensure the retention of the conquered terrain, by reversing the trenches against the enemy, and then by furnishing them with means of defense, whenever there is a check in the forward movement.

When the attacking troops arrive at their assigned objective, the conquest of the position is generally assured. The engineers, aided by workers from the infantry, organize it on the same principles as the previous position.

The general limits of the position are determined, both by topographical considerations, and by the situation of the troops; the latter must be speedily provided with defenses so as to prevent a *retour offensif*, or counter-attacks. To this end, the commanders of the attacking units fix the outline of the new trench; detachments of engineers help the infantrymen in fortifying this line, making as much use as possible of the enemy's works, the inequalities of the ground, ditches, and hedges. Above all, speed is necessary in order to ensure the retention of the new conquest, and to save the victorious troops from needless losses. The infantry sappers, who have already been trained in these different jobs, and especially in the setting up of accessory defenses, are at this moment of very real assistance.

In the position itself, the engineers construct artillery observing stations and create or refit the shelters for the men and their officers, while the telephone men speedily carry their wires to these different points. Places suitable for observing stations are pointed out by the infantry officers in the course of their advance, and accepted, if need be, by artillery officers specially detailed to accompany the infantry; no sooner is the

choice made, than the artillerymen use all means at their disposal to establish permanent liaison with their batteries.

The need for the speedy completion of these works, both along the front and in the interior of the conquered position, is entirely subordinate to their tactical importance. Thus, while some details of engineers, distributed among the attacking units, are engaged on the methodical organization of the different sectors, those elements which have remained at the disposal of the Command are grouped in detachments varying in size with the tasks to which they are assigned; these detachments fortify solidly points of tactical importance and parts of the front exposed to a *retour offensif* or menaced by counter-attacks.

A judicious distribution of machine guns, both by the leaders of the attacking units and by the generals, and their timely use, will give most effective aid in the defense of the position.

The guiding principle, both in ordering the construction of works and in the adoption of measures, is perfectly simple; a position once conquered must never be lost.

The organization of the position is the immediate and logical consequence of its capture; in no sense does it imply a halt in the advance. On the contrary, the organized position furnishes a base and a *place d'armes* for those fresh troops whose duty it is to pursue the enemy, if he gives up resisting, or to attack the next position, if he has prepared one.

CHAPTER IV

PURSUIT

The capture of a position is but a means of achieving victory; the only sure sign that victory has been won is the destruction of the enemy's forces.

It is, therefore, necessary to pursue troops forced out of a position and overtake them by every possible means; at the same time troops remaining in line to right and left of the zone of attack must be taken in the rear, cut off from their communications and reserves, and either destroyed or surrounded. Thus the line is pierced, not only because the material barrier is overthrown at a given point, but also because the army which was sheltering itself behind it is reduced in numbers and broken up, and because its fragments are easier to crush.

The crushing of the fragments of the enemy is the indispensable complement to a successful attack upon a position; it must be immediately undertaken, so as to prevent them from reassembling and from forging new links to bind themselves together.

Speed is the condition essential to the success of these operations, and this is obtained by resolution on the part of the Command, by the rapid despatch of sufficient reserves, and by the spirit, the audacity, and the endurance of the troops.

The maintenance of contact with the enemy is effected by the attacking troops until they are relieved by the arrival of new elements.

The limits of a conquered position are in no sense absolute or impassable. While establishing themselves in it, the attacking troops send out patrols and reconnoitring parties beyond it to observe and harass the enemy. The echeloning one behind the other of the units of attack permits them to re-form easily, by closing up on the foremost elements; in this way the men once more come under the command of their accustomed leaders, which would be impossible if other formations were used. The despatch and functioning of patrols are also better secured in this way.

The attacking troops suffer less in direct proportion to the rapidity of their success; but even if they are not obliged to reorganize they do not leave the position that has been won and go themselves in pursuit, except upon order from the Command.

Continuity of movement beyond the position is secured by the Command which, being accurately informed by frequent reports, makes the necessary arrangements, directly it can see the possibility of success.

Fresh troops of infantry brought successively up to the field of action advance beyond the conquered position and take the place of the patrols and reconnoitring parties sent out by the attacking troops; they constitute the element of shock and of resistance in the pursuit. In exceptional cases this task may be entrusted to the first attacking troops, who are then replaced in the occupied position by others.

Motor cannon, motor machine guns, and bicycle groups use the roads which the sappers accompanying the attack have taken care to repair. These units constitute the element of speed which is so important in pursuit. One or two armored

motor cars go ahead to clear the road in order to avoid an accumulation of vehicles in front of an unforeseen obstacle; they transport some sappers for the purpose of making quick repairs; special gangs of workmen at points along the road have the task of inspecting and repairing it.

The enemy, moreover, needs these roads up to the last moment for the evacuation of his artillery, his matériel, and his convoys, so that he is prevented, if closely pressed, from injuring them. The zone in which the roads have been rendered useless by defensive works and constructions, and the effects of the bombardment, is, comparatively speaking, not deep; it lies in the immediate vicinity of the enemy's first line trenches. Beyond it, the retiring troops often lack the time to effect the destruction of the roads, as originally planned, particularly as they are obliged to utilize all the ways of communication up to the very last moment.

The cavalry is brought close to the position along itineraries previously reconnoitred, and does not take part in the crossing of the zone of trenches until after new reconnaissances have been made. It is often obliged, in order to avoid encountering insurmountable difficulties, to make use, at the outset, exclusively of roads. In every case it assumes formations calculated to avoid the effects of the enemy's artillery fire. It constitutes an element both of acceleration and of resistance; but it would sacrifice itself uselessly if it hurled itself against infantrymen protected by trenches.

The artillery goes to emplacements previously determined. It maintains its liaisons with the elements entrusted with the pursuit, so as to facilitate their progress, if they encounter obstacles, and to bombard hostile concentrations if any are seen. The artillery officers detailed to accompany the infantry

gather information regarding emplacements and observing stations to be occupied on the occasion of fresh advance.

The forward deplacement of the artillery is planned as completely as possible in advance.

The troops entrusted with the pursuit may, at least at the start, be preceded by an artillery barrage, similar to that which precedes the attacking troops. This barrage protects them at the moment of their leaving the conquered position, and is continued as long as need be; it is effected by a rapid deplacement of a portion of the artillery, especially that portion which took no part in the attack. This barrage is generally kept up only for a short time, in order to give perfect freedom of action to the troops in pursuit.

It is important, on the other hand, to give these troops constant protection against the fire of the enemy's artillery. To this end it is necessary to deplace rapidly a certain part of the long-range mobile artillery and of the field artillery, and to arrange groups of pieces to destroy, or at least to neutralize, the artillery of the enemy. These groups are constituted, either by batteries previously located near the line of departure, but inactive during the attack, or by batteries reserved for this purpose, or, finally, by batteries whose range has been exceeded by the progress of the advance.

The deplacement of the artillery is effected in several echelons, in such wise that the same battery shall be deplaced as few times as possible and may utilize its full range before being moved forward. It is always the rearmost echelon which is moved; it is placed in front of the foremost one, obtaining therefrom all available information, and always maintaining liaison with the infantry which it supports.

The engineers are given the task of reëstablishing and improving the means of communication. The railways, whose use has been made possible by the advance of the troops, are repaired; existing lines are prolonged if there is opportunity.

The aviators follow attentively the various movements of the enemy's troops; they furnish the Command with information as to the direction of the retreat, the intervention of reinforcements, the whereabouts of reserves, and the occupation of new positions.

If the defeated troops are pursued without respite or delay, they can neither reorganize nor oftentimes even occupy positions prepared beforehand in the rear; they hastily abandon defenses which have been laboriously constructed; furthermore, they bring disorder among the reserves designed to reinforce them, and involve the latter in their own disaster.

Thus a position organized in the rear of the first, and capable of offering a like resistance, may fall into the hands of the pursuing troops, if they fall upon it by a bold, rapid, and decisive stroke. This bold stroke, the consequences of which may be considerable, should always be attempted; its success depends primarily upon the disorder and demoralization obtained by the pursuit.

The disorder and demoralization of troops in retreat and of reserves are the work of the various units to whom is entrusted the duty of ensuring continuity of movement.

The motor cannon and motor machine guns are moved boldly forward, as are also the bicycle groups, who may, as circumstances direct, either support them or operate independently. In every case these units maintain connections with each other, so as not to get in each other's way, and so as to concentrate their efforts.

Armored motor-cars have as their special task the destruction of hostile machine guns which have remained in place or have been set up quickly in position to fire; being provided, on account of their small calibre, with a supply of munitions sufficient for their immediate needs, they perform a part which less light and mobile cannon cannot play. They become useless as soon as their ammunition is exhausted. They must therefore avoid all waste, and provide in advance the means of re-supplying themselves.

Motor machine guns try to embarrass the retreat of the infantry, which they attack on the flanks and in the rear, and also of the batteries and convoys, whose horses and drivers they kill. They can obtain considerable results in the way of disorganization and dispersion, thus preparing the task for the infantry.

Furthermore, infantrymen can be transported by automobiles, following after the motor artillery, up to a point where prudence compels a halt. Movements appearing at first unlikely to succeed are easily carried out if the enemy's artillery has been silenced, if it runs short of ammunition, or if it is engaged in beating a retreat.

The cavalry resumes a greater freedom of movement after crossing the zones of trenches. It completes the work of the motor vehicles and cyclists. In the performance of this task, it leaves the roads in order to overtake and surround the retreating troops, who, because of their demoralization, often surrender without fighting; it takes batteries and convoys unawares; it occupies certain important points until the arrival of the infantry; it interrupts telegraphic and telephonic communications; it cuts railways which may be used by the enemy. By its multiple contact with the adversary it

gathers in valuable information, which it sends with all speed to the Command.

The infantry endeavors to gain ground, so as to support the efforts of the more rapid arms and complete their action. It should be careful, as soon as it is overtaken by them, not to fire in such a way as to interfere with their operations or to hit them. It collects the prisoners and conducts them to the rear, surrounds resisting detachments in order to make them surrender, and seizes such batteries or convoys as it is able to catch up with. It ensures the occupation and retention of the terrain, and forms a rampart to whose shelter the other arms can fall back, in case there is a *retour offensif* or a counter-attack.

The field artillery, by dint of a judicious choice of observation posts and constant maintenance of its liaison with the front ranks can immediately bring hostile concentrations under its fire, cut off the retreat of pursued detachments, and destroy batteries or units in deplacement. The heavy artillery directs its fire upon villages, crossroads, railway-stations, and railways still in the enemy's hands. Artillerymen cannot take too many precautions in order to avoid mistakes which might paralyze the pursuit.

Aviators contribute effectively to the destruction and demoralization of the retreating troops; some by directing the fire of the batteries upon objectives which have escaped the sight of observers on the ground; others by bombarding columns on the march, batteries in deplacement, cantonments of reserves, workmen organizing a new position, troops intended for the defense, railways stations, and railways. If the enemy's artillery is silenced and if the fighting planes protect them well, they can fly low and accomplish much.

Thus by means of the action of the different arms the task of the infantry is facilitated; but the infantry alone has the means of reaping the benefit of the disorganization which has been attained. After long waiting it has its innings; after toilsome and bloody days it wins easy successes which raise its spirits to a high pitch of enthusiasm.

Taking in the rear of the enemy's lines is a logical consequence of the carrying of a position and of the pursuit of its occupants. It is the attacking of new positions on three sides instead of on one. Its aim is the enlargement of the breach, the breaking-up of the enemy's line, and the successive crushing of the forces which defend it. It is carried out bit by bit and its execution is entrusted to fresh troops.

The cavalry plays the principal part in this expansion of the battle. Seeking for free ground beyond the conquered position, it spreads out broadly behind the enemy's trenches, so as to interrupt communications, prevent the arrival of fresh supplies of men, food, and munitions, and cut off the retreat of the defenders.

In the accomplishment of this task, the cavalry displays a boldness which exposes it to great dangers, but which is fruitful in important results.

Under its protection, the motor cannon and the motor machine guns are enabled to advance to places from which they fire upon isolated points of resistance, upon troops in deplacement, upon batteries in position, upon concentrations, and upon convoys. They have some chance of escaping from the fire of the enemy's artillery still in action owing to the proximity of his trenches and of his infantry; nevertheless, their task is as dangerous as that of the cavalry.

The infantry alone is able, as in the pursuit of troops from a position, to complete the results obtained and to occupy the terrain. Its attack on the rear of the position is developed according to the usual rules, but with differences of detail; it has to execute a march of approach during which it must itself ensure the protection of its flank and rear; it does not require so intense an artillery preparation, since it encounters almost no accessory defenses.

The artillery, placed at properly chosen points in the occupied terrain, supports the other arms, particularly the infantry, when it attacks; it seizes every occasion to destroy or to disperse the enemy.

The maintenance of liaisons of every kind is the more carefully to be watched in proportion as it becomes more difficult; the slightest remissness may entail irreparable errors, particularly in artillery fire. It should be noted that there are in operation not only heavy pieces and also some of the field-pieces originally designed to batter the occupied position, but also all the artillery facing the trenches taken in the rear. If precise and frequent information is not sent to the Command, if the observing stations and the aviators are not careful to report the movements of troops, the projectiles intended for the enemy may have the result of delaying the advance.

The rôle of the Command, limited during the attack to that of a spectator desirous of full information, becomes more active in the pursuit.

The duty of the commander of an army corps entrusted with carrying a position is to give an account to the commander of the army, at the earliest possible moment, of the progress of events. This task is easy because of the relative certainty of the telephonic and telegraphic communications

established between the large units. In accordance with this information, the High Command gives orders relative to the pursuit of troops driven from position, and later to the taking in the rear of the adjacent troops.

The pursuit of troops driven from the position may be entrusted to reserves belonging to the army corps which has carried out the attack. But the taking in the rear of adjacent troops is really a new attack, requiring new forces; it is only developed in accordance with available means.

The advance of the victor, in depth as well as in width, must be limited by well-defined instructions and by clearly determined objectives. While necessarily bold and rapid, it must be methodical and certain. For that purpose commanders of the units involved must go forward at the same time as their troops; not only will they thus be more fully and quickly informed, but they themselves will understand the situation better, and be able to make use of all those qualities of quick observation, decision, and character by which they have justified their right to command.

It is by trusting to the value of their information, to the acuteness of their judgment, and to the ingenuity of their arrangements, that the Commander-in-Chief is able to throw in at this point the reserves necessary to complete the local success and transform it into a brilliant victory.

These reserves are distributed in proportion to the difficulty and importance of the tasks to be accomplished; on some occasions they all come in together under the command of a leader assigned to them; on others they participate in the work of a large unit already in line, as, for example, by taking in the rear a position which this unit is attacking from the front.

All the troops in a battle thus enlarged are placed under the orders of a Commander-in-Chief; he knows the end to be attained and the size of the forces on which he can count, and he determines the sphere of activity of each of his subordinates.

The inrush of many troops upon a relatively restricted position and their passage through the same breach before it is fully opened up are operations all the more delicate because the rapidity of their execution is indispensable to success. The Command regulates their transportation by railway and automobile, their crossing over into the zone of trenches, and their debouching towards the indicated objectives, in such a way that the flow of men shall correspond with the urgency of the operations.

The order and speed of these movements depend in great measure on the manner in which the attack has been prepared and carried out. Every measure intended to facilitate the sending forward of troops commanded to take the position is a help to those who follow them. The knowledge of the terrain acquired by the units of attack must, moreover, be utilized. Finally, trustworthy guides in sufficient numbers, provided by these units, are more valuable than any topographical description or any sign post, to ensure the rapid bringing up of the reserves.

The supply of food and munitions is provided for and overseen by the Command; it is facilitated by measures previously adopted. The arrival of ammunition when required, particularly for the artillery, takes precedence of every other need. Victory goes to that one of the adversaries whose projectiles are exhausted last.

CHAPTER V

MARCH OF APPROACH

The object of the march of approach is to bring troops within assaulting distance of a position, without incurring losses.

When an attack starts from the first line trenches, there is of course no march of approach for the first waves; for the later waves and for the reserves, it is reduced to the operation which is called " advancing through the boyaux."

But when the attack is the immediate sequel to other operations, the march of approach assumes a different aspect.

After taking the position, the troops sent forward in pursuit may encounter, either at the beginning of their progress or after they have advanced some miles, a second position, previously organized.

If, by a bold surprise attack, they succeed in taking it, its occupation is accomplished with all possible speed, in accordance with the usual rules.

If, on the other hand, they encounter a vigorous and obstinate resistance, their only means of overcoming it is a new attack, whose importance may equal or surpass that of the previous one, and whose execution requires a new preparation. The Command is the sole judge when the moment is ripe for this attack. As soon as it is decided upon, it necessitates a march of approach between the position already captured, and the one that still remains to be taken.

The preparation of the approach is designed to ensure, during the march of the troops, relative security, a constant direction, and perfect order.

It constitutes the initial act of an eventual attack and has, for just that reason, a considerable bearing upon its success. Troops badly started find difficulties to overcome, whereas, once well launched, they go straight on to victory.

The fresh troops who have been sent forward in pursuit are generally entrusted with the new attack. For reserves, they have the troops who have carried out the previous attack and who have been re-formed in the conquered position, until the arrival of other units to whom the Command may assign this task. The principles and the procedure according to which they execute their march of approach are applicable to all other troops.

The question of speed, essential in pursuit, is important in the approach; but it is subordinated to two other conditions — the safety of the troops, and the determination of the directions in which they are to go. Whereas in the pursuit, the troops expose themselves boldly in order to overtake the enemy, and capture with a rush such objectives as they may chance to discover in their advance, in the march of approach they must take every precaution to arrive intact at assaulting distance, and from the outset make for definitely determined objectives.

Previous study of the position is the surest way of obviating unnecessary losses; it permits a choice of suitable itineraries, and an avoidance of dangerous changes of direction. It is made by means of every kind of information gathered by the Command. Photographs of the aviators furnish the most precise data. The advanced elements of the pursuit check up

these data; in the exceptional case of war of movement, this task is performed by scouting parties of cavalry, and the foremost elements of the covering troops. These last, by their bold dashes, manage to determine the contours of the position, the best routes of access, the weakest points, and the morale of the defenders. All this information, coördinated with that supplied by the maps of the country, by observations taken on the ground, and by prisoners and deserters, gives a general idea of the forces and means necessary to approach and to carry the position.

The Command can then assign to each unit its task, determine its itinerary, and indicate its objective. Before starting out on the march, each unit has its route reconnoitred and places itself squarely opposite its objective in order to avoid irresolution and delays, as well as changes of direction under fire.

These dispositions do not give sufficient security to the infantry if they are not supplemented by the installation of batteries. The infantry cannot defend itself by its fire either against rifles and machine guns, or against cannon; it looks solely to its own artillery for protection, which must therefore be ready to extend in front of it the curtain of fire under cover of which it advances.

The execution of the approach, facilitated by a careful preparation, may be rapid, and may be the prelude to a victorious assault.

Each division of infantry advances in its assigned zone.

When the distance which separates the conquered position from that still to be taken is considerable, the infantry should march with cavalry protection, in route columns, extended as

much as possible. In the first line divisions the artillery does not march in the lead, but only sends forward its reconnaissance personnel, with the telegraphic and telephonic equipment. In the second line divisions, on the contrary, the artillery itself should take the lead, so that it may be immediately drawn up in line. The information centres which communicate with the airplanes are moved forward by sudden rushes.

When the distance between the two positions is not great or when the fire of the enemy's artillery is dangerous, the infantry deploys and advances from cover to cover; it does its utmost to effect the rapid seizure and immediate organization of points which might be used for observing stations.

The infantry is formed, as for an attack, in successive waves, the contiguous units of which are echeloned in depth. But the first waves, instead of being lines of skirmishers, are lines of small columns; such a formation is less vulnerable, permits changes of direction to be effected with less risk in case of mistakes in defining the objectives, gives greater facilities for manoeuvering if occasion arises, and frees the troops from the temptation of useless firing.

The advanced elements of the pursuit, who have held their ground in order to continue their observations, permit themselves to be passed by the infantry, and transmit to it all the information acquired; they then fall back under its protection.

The infantry gains ground little by little; it stops only to rest, since its fire is ineffective. It is constantly protected by the artillery, which watches its progress and maintains liaison with it. It is accompanied by machine guns and by all the movable trench artillery; the advance of this artillery and of the various accompanying pieces is regulated in accordance

with the amount of ammunition which can follow without difficulty, for they should not be impeded by those pieces which it is impossible to keep supplied.

If a part of the field artillery has remained in its original position, it moves forward. As to the heavy artillery, which is difficult to move, it does not make its arrangements to advance until the attack has progressed beyond the point where it is able to support it. When the amount of material available permits, the Command keeps heavy pieces upon motor tractors and railways in readiness to accompany the forward movement, as soon as the state of the pursuit makes it probable that it can be continued.

Advances of artillery are generally effected by echelons, according to the same rules as are followed in a pursuit. They are effected at night by reconnoitred and prepared itineraries; but they can often be carried out in the daytime, before the enemy has had time to get himself in hand again.

Indeed, the attack on a position ought to be hurried, so as to have better chances of success. Furthermore, while the infantry advances, an intense artillery fire is delivered with the twofold purpose of protecting its march and preparing its assault.

The adjusting planes coöperate with the batteries, while the scouting planes continue to gather information concerning the disposition of the enemy.

The engineers work hard at the improvement and security of the roads intended for the reserves, the heavy artillery, and ammunition.

As soon as the first waves are exposed to the fire of the enemy's infantry and machine guns, they deploy as skirmishers in order to continue their march. As the distance

grows shorter, their progress becomes more difficult and is accomplished by the quick rushes of elements of different sizes, advancing from cover to cover; the N. C. Os. see to it that a relative alignment is maintained, so that the waves remain solidly constituted. The artillery pieces assigned to the infantry battalions and the machine guns accompany the first wave, so as to facilitate its march and to prepare for its assault.

When it has arrived at assaulting distance, the first wave re-forms and takes cover behind natural obstacles and in hastily-dug individual entrenchments. The artillery opens fire energetically against the position, as do also the infantry cannon, the machine guns, and other accompanying pieces, so as to destroy the supplementary defenses, demolish the parapets, and either kill or terrorize the occupants. The scouts and the observers carefully watch the effects produced by this preparation upon the various points of the line. As soon as it is considered sufficient, notice is given the artillery to increase its range at a given signal or at a given moment. This signal or moment is that of the assault.

If the assault fails and cannot be quickly renewed with chances of success, there begins a period of stationary fighting; trenches must then be organized.

The rôle of the High Command, when the combat is thus enlarged, increases progressively in importance. The generals in command of army groups and the Commander-in-Chief, who have already issued general directions in regard to the pursuit, must now make more definite decisions, and issue orders for attack.

While the troops told off to capture the second position perform their march of approach, others proceed to take in

the rear the positions adjacent to the first one. A battle of large extent begins. If the second position is carried, a decisive victory is in sight. The chance must not be allowed to escape; the fruit of patient, prolonged, and bloody efforts must not be lost at the last moment. To this end, the High Command sees to it that the battle front is well supplied with men and ammunition, while at the same time it limits the efforts made at other points in the line and even confines them strictly to the defensive.

The responsibility assumed is crushing, but the task to be accomplished is magnificent. Every organism in the army comes into play and works without respite. The railways and motor trucks convey the reserves, the heavy artillery, munitions, and food, whose immediate forwarding or temporary maintenance are carefully regulated. Every service is engaged in this task, according to the instructions of the Command.

In the general advance, the forwarding of heavy artillery often presents great difficulties; it must, however, be accomplished whatever the cost, so as not to expose victorious troops to the risk of being definitively held up. At this stirring moment more than at any other, a close liaison must be maintained between the different arms, so as to ensure continuity of movement and to make the most of the success obtained.

The infantry is powerless to extend the radius of its action and to maintain its advance, unless it be faithfully followed up not only by the field artillery, but also by the heavy artillery. It may be victorious over a fleeing or demoralized adversary, when supported only by field artillery; but it is doomed to failure when, without heavy artillery at its disposal, it hurls itself against strongly organized positions. Even if it carries these positions, at the price of costly efforts, it will neverthe-

less be obliged to evacuate them and fall back again under the sheltering wing of this indispensable ally.

The rapidity of marches of approach and of assaults may hamper the enemy's artillery in its fire for a short time, owing to its uncertainty regarding the respective positions of the two adversaries; but this period of uncertainty cannot continue indefinitely, particularly if the enemy's artillery, in order to save a dangerous situation, does not scruple to fire on its own men.

The rapidity of the assailant's success or the skill of his manoeuvers may place the enemy's heavy artillery in danger and may even result in its capture. In that case the light artillery once more plays the principal part.

The successive positions, moreover, are naturally in less and less close lateral connection, which permits of manoeuvering; they are also less and less organized, which facilitates attack. In fact the war of movement begins again.

The army which has been able to bring this about has already won the victory. It devotes itself wholly to following up its success with those means which the Commander-in-Chief thenceforth distributes with lavish hand.

PART IV

DEFENSE OF A POSITION

CHAPTER I

GENERAL OBSERVATIONS ON DEFENSIVE FIGHTING

The defense of a position aims to oppose the progress of the enemy, until such time as it be possible to change over to the offensive.

It is rendered necessary either by the need of awaiting favorable circumstances and sufficient material means for attack, or by the decision to hold certain parts of the front with a minimum of troops, so as to be able to make a more considerable effort elsewhere.

When the defensive goes on with no other symptoms than rifle fire, bombardment, reconnaissances, patrols, mining, and raids, it becomes a mere process of stationary fighting in the vicinity of the enemy; it is simply "trench warfare" over again. When it is opposed to a methodical and stubborn attack, delivered by the enemy with every resource at his command, it is "defensive combat."

Defensive combat extends over that part of the front which is attacked by the enemy, that is to say, over one or more contiguous positions.

The study of its development in any one of these enables us to grasp it in its entirety. This development includes, as successive phases:

The organization of the defense;

The defense of the position;

The retreat, when the enemy is victorious;

The *retour offensif*, designed to retake the lost terrain.

The immediate aim of defensive combat is the holding of the position in spite of every attack; but it is intimately bound up with the general aim which dominates every act of war — namely, the destruction of the enemy's army. The commander in charge of the defense, while always energetically maintaining his hold on the terrain entrusted to his protection, seeks to inflict the heaviest possible losses upon the attacking troops, and to diminish the general capacity of the adversary for future fighting; he thus prepares the way for the victorious offensive of the morrow.

CHAPTER II

ORGANIZATION OF THE DEFENSIVE

DEFENSIVE combat takes place in the position on which the troops have been established, sometimes for many months.

It is the sudden realization of an event constantly anticipated. It should not, therefore, involve any special preparation; in the first place, because such preparation is being made every day during the time of stationary fighting; and also because the enemy's attack is generally in the nature of a surprise.

An attack, nevertheless, does not take place until significant symptoms have indicated its imminence to attentive observers.

The accumulation of batteries of artillery, the labor necessary to install them, the activity of the air service, the great number of trains bringing troops and supplies of all kinds, the massing of reserves in the cantonments and bivouacs close to the front—no one of these symptoms should escape the watchful eyes of the aviators.

The preparatory work carried on by the enemy's first line—saps, mines, departure parallels, openings in the accessory defenses — are discovered by the sappers and engineers, by the artillery observers, and by the watchers and the patrols, whose vigilance must never relax.

Prisoners and deserters, who have seen the preparations and who often have on their persons instructions from their

commanders, furnish valuable information and a means of verifying what has already been learned.

Finally, an intense artillery preparation, often lasting several days, precedes the assault on the position.

As soon as there is prospect of an attack, the troops occupying the position are notified. They redouble their watchfulness and their precautions. Their commanders of every rank take all the necessary measures to enable them to fulfill their tasks.

The troops maintain their organization and perform their regular duties in accordance with the usual rules, but are specially forewarned against the effects of a surprise. There are also certain measures which will render them even better prepared for the ensuing struggle; these have to do with the detailed study of the two opposing positions, with the material *aménagement* of the position, and with the physical and moral preparedness of the troops. Lastly, the Command must not forget any of the duties which fall to its lot.

The detailed study of the two positions is carried out in advance by all the troops which may be called upon to fight on this terrain. It is as advantageous for the preparation of the defense as for that of the attack.

As regards the position to be defended, this study helps in attaining a thorough knowledge of the various routes; in consequence, it facilitates rapid execution of reliefs, avoidance of dangerous passages, the bringing of immediate assistance to contiguous units, the reinforcement of menaced points without hesitation or delay, withdrawals with avoidance of losses, and successful execution of counter-attacks or *retour offensifs*, even at night.

As regards the opposing position, it facilitates the discovery of the enemy's arrangements, and his eventual means of attack; it makes possible the anticipation of his probable routes of access, and the adjustment of the barrage fire in advance, the determination of the most vulnerable points in his line and the preparation of counter-attacks, the location of the openings made in his accessory defenses, with a view to bringing them under machine-gun fire.

Furthermore, the study of the two positions should be made as for an attack, not only by consulting the maps of the topographers and the aviators, but also by personal inspection and traversing of the trenches themselves in every direction, and by always keeping some one in the observing stations.

The material aménagement of the position consists simply in the inspection and improvement of its organization during the period of stationary fighting. These are effected in accordance with the latest information received concerning the enemy.

In the advanced part of the position, the orders to be given are as follows: Inspect daily the condition of the accessory defenses, restoring as soon as possible those which have been destroyed or impaired. Rectify any parts of the outline of the trench which cannot be held without exposing their defenders to losses disproportionate to the advantages gained, or which may endanger the security of the line. Reinforce the guard and observation service. Ascertain whether the machine guns can take under flanking and enfilading fire those zones which the enemy must cross. Make certain by actual trial that the transference of the machine guns from their shelters to their fire emplacements is as near as possible instantaneous, and that their mechanism works perfectly. Dig false trenches,

and cover the real ones with *camouflage* as thoroughly as possible so as to dissipate the fire of the enemy's artillery. Maintain a complete supply of munitions of all sorts, and of food. Strengthen the liaisons, both lateral and in depth.

The liaisons must be watched with particular care at the points of junction of the different corps. The enemy knows that these points are vulnerable, in consequence of the divided command, and is watching them carefully, with a view to attacking there.

In the interior of the position, the following measures must be taken: Look after the condition of the observation posts, shelters, communicating and support trenches, and make others in different places, if need be. Make sure that the obligatory points of passage, and the points of tactical importance can be taken under the fire of machine guns whose shelters are in good condition, whose firing emplacements have been reconnoitred, and whose crews know their job. Arrange for the supply of the depôts for munitions, water, and food. Construct new access and evacuation boyaux in view of the possibility that the intensity of the fight may render them necessary. Increase the number of sign boards, police posts, liaison agents, and guides; this will ensure good order and rapidity of movement. Increase also the number of *places d'armes* where reinforcing and relieving troops may be kept near the line of combat, without being congested or exposed. Prepare all sorts of obstacles and means of resistance, such as barricades for the boyaux, stations for grenadiers, etc., in case the enemy should break into the trenches.

As regards obstacles, one of the most effective consists in wire entanglements on the reverse slope; these cannot be destroyed by artillery, since they are in a dead angle; more-

over, they stop the progress of the attackers, who are either demoralized at encountering them, or decimated in trying to cross them. If there be no natural reverse slope, it is a good plan to prepare an artificial one, at least several yards wide.

For the rear of the position, the orders to be given are as follows: Every line of communication used in forwarding troops, ammunition, and food must be kept in the best of condition. Special gangs of workmen must be in readiness to keep these ways in repair; they will be subjected to exceptionally heavy strain, owing to the violence of the bombardment, and the great amount of traffic. With regard to railways, these should be double-tracked and extended when necessary, and those sections which are specially exposed to the enemy's fire should be shifted so as to prevent their being cut. Constant watch should be kept on the general circulation, remembering that the necessities of the defense take precedence of everything else.

In general, a close coöperation of the different arms, each fulfilling its proper function, tends to create an organism which leaves nothing to chance; the administrative departments, especially the sanitary service, whose activities may save so many lives, should make every effort to prevent being interrupted in their work.

The physical and moral preparation of the troops takes a long time, and grows more and more arduous with the approach of defensive combat.

The troops assigned for relief, and more especially those detailed for counter-attacks, will recover their agility, their spirits, and their vigor in the cantonments or bivouacs to the rear of the position; they in their turn take the places of those

who have been in the trenches, while the latter seek repose after their fatigues and losses.

The commanders of every rank try to raise the morale of their men to a high pitch, and quicken their patriotism; they instill into them the idea that they must hold the position entrusted to their charge, come what may, and let themselves be killed on the spot rather than allow it to fall into the enemy's hands.

The rôle of the Command consists in foreseeing the events which may arise, and in taking the proper steps to avoid or at least to limit the scope of a reverse.

The commander who is given the task of defending a position draws up a plan of defense: he studies the situation of the enemy, decides upon the distribution of his own troops, both laterally and in depth, assigns their duties to the different arms, and estimates what reinforcements may become necessary. He should not only prepare to resist to the last, but must also keep in mind the possibility of an evacuation. If he should be forced to retreat he will have to direct his troops and his matériel to a position in the rear, so as to be able to make a resistance there, with the support of fresh troops. This second position should be situated four or five miles behind the first, so as not to be in range of the same artillery fire, and so as to escape the possible effects of asphyxiating gas. In case such a position has not been previously chosen, and in case its selection and organization have not been entrusted to the commander of the first one, the latter should ask for orders in regard to it from the responsible commander as soon as possible.

The commanders, up to the very highest rank, should determine the measures to be taken on the actual ground and in

person; their presence, their advice, and their observations infuse into everyone a desire for work, and a dash which no written word or telephone message can hope to equal.

Conscious of the responsibility weighing upon him, the commander never takes his mind off the task with which he is entrusted; not only does he look ahead and give orders, he sees to it also that his orders are carried out. He should bear in mind that if there is anything lacking in the organization of a position in which troops have been stationed for a long time, it is because their commander has given proof of incapacity, and has failed in the performance of his duty.

CHAPTER III

DEFENSE

The object of the defense is to drive back the enemy when he attacks the position, and at the same time to inflict upon him the heaviest possible losses. Not only does it thus ensure the inviolability of the front; it also lowers the adversary's morale, exhausts his strength for future struggles, and favors the offensive either at the place defended or at some other point.

The maintenance of the troops under bombardment is the first phase of the defense.

This phase is almost wholly passive, at least for the infantry. It consists in remaining in place, in spite of the shells of every calibre which demolish the trenches, break down the parapets, destroy the accessory defenses, smash in shelters, blow to pieces or bury their occupants, and cut communications with the rear. The morale of the troops prevents their weakening in these critical circumstances, and enables them uncomplainingly to occupy ground where death is everywhere; the ascendency and example of the leaders help greatly in maintaining this morale.

During the lulls, particularly at night, the infantry, helped by the engineers, hastens to repair the accessory defenses, to rebuild the parapets, to free the trenches, and to reconstruct the shelters and observation posts; it sees to the burial of the dead and to the evacuation of the wounded.

Artillery alone is able to diminish the intensity of the bombardment by attempting to destroy or to silence the enemy's

batteries. Aided by the observation-balloons and by the fire-adjusting planes, the heavy and field artillery make every effort to accomplish this result.

These groups ought to avoid " zone fire " which does not serve to destroy the enemy's pieces; they should devote their attentions to definitely determined " nests " of hostile guns. They may use special toxic or lachrymatory shells for this purpose to good advantage, in order to neutralize the enemy's fire; for the enemy's artillerymen, since they are obliged to seek shelter or to put on their gas masks, are thus rendered incapable of serving their pieces effectively.

When the attack seems imminent, as is indicated by movements taking place in the enemy's lines, the artillery carries out a counter-preparation, which may be very effective both upon the concentrations which have been pointed out and upon the trenches in which the assailants are massed.

Since the enemy frequently uses asphyxiating gases in the periods preparatory to his attacks — the defenders of the position should be thoroughly trained in the means of protecting themselves. Strict orders oblige officers and men to have their masks with them on all occasions, ready to be put on — even when they are several miles behind the lines; for not only can gas waves be blown a considerable distance by the wind, but also asphyxiating shells can carry the terrible poison a long way. Only by rigorous discipline, and constantly reproving the natural carelessness of the men, is it possible to defend their lives against this barbarous practice, specifically forbidden in treaties.[1]

[1] The use of these methods was forbidden, as contrary to the laws of humanity, by (1) the Declaration of Petrograd (11 Dec., 1868) and (2) the Declaration of the Hague (29 July, 1899), signed and ratified by Germany, Austria-Hungary, Bulgaria, and Turkey.

The defense of the first line is ensured by close coöperation between infantry, machine guns, and artillery.

As soon as the enemy's real attack (not merely a trial wave) leaves its trench, it is greeted with a barrage fire from those batteries which have been given the task of stopping it. Other batteries fire upon reinforcements as they move forward and upon reserves at their stations. Isolated pieces of artillery, or even advanced batteries, which until then have kept silent so as not to run the risk of premature destruction, unmask themselves at the opportune moment, and open fire upon the advancing masses; pieces which move on rails are specially valuable for this purpose, since they can be taken to desired points in a few minutes, and then be put in shelter as soon as their task is fulfilled.

The defenders of the first line, sheltered as completely as possible during the bombardment, are notified by their watchers as soon as the enemy begins his advance. Then instantly rifles and machine guns are mounted in the remaining elements of the trenches, the shell holes, and mounds of earth which constitute the line. The infantrymen, who have been careful always to keep their arms in good condition, and to prepare sheltered positions from which to fire upon their assailants, breathe more freely because the enemy's artillery is obliged to lengthen its range. The machine-gun crews immediately come into action, and try to take the enemy in flank or in enfilade, adjusting their fire calmly; the riflemen take deliberate aim, at a distance and under conditions in which every bullet should tell.

If the enemy's troops, despite their losses, reach the accessory defenses, they encounter an obstacle which, notwithstanding its partial destruction, is generally not to be despised;

it causes delays in their march and disorder in their ranks, and diverts their attention from their real objective. The machine-gun crews and the infantrymen seize this moment to finish their work of destruction; the grenadiers render them great assistance by throwing their hand grenades among the assailants, who are in difficulties with the débris of the wire-entanglements. When the survivors of the waves or assaulting columns reach the immediate vicinity of the trenches they are bayoneted; but they are often so few in number, so demoralized, or so worn out, that they surrender; in this event, they are immediately sent to the rear and questioned.

Directly any element of the trenches falls into the enemy's hands, the adjacent elements strive to inflict losses on its occupants and to surround them. A *retour offensif* is attempted as quickly as possible, before the enemy has had time to reorganize.

Unity of purpose constitutes the true liaison between the troops. Whereas on the offensive it is obtained by the converging of efforts upon the objective, it is realized on the defensive by the common will to resist at any price, and to retain the terrain held.

The artillery, in addition to executing barrage fire in predetermined directions, may also take the attacking lines or columns at an angle or in enfilade; it must not let such a chance escape. Furthermore, the Command, in case the distribution of batteries is that which was adopted during the period of stationary fighting, should be on the watch to change it as soon as the enemy attack occurs. New groups are constituted with reference to the needs of the defensive as it develops; sometimes they can be provided beforehand in the plan of defense.

Fighting in the interior of the position presents certain analogies to the defense of the first line, since the enemy attacks successive lines defended by the same methods; but it differs from it in the fact that the lines are much less sharply marked, and that the enemy is scattered about in a number of shelters such as shell-holes and sections of boyaux.

The assailant has a moral advantage, owing to his first success; but he is under the disadvantage of fighting on unknown ground full of traps, where the defender can find his way about without any hesitation, even at night. Fighting in the boyaux is full of dangers and surprises for anyone who is not conversant with their windings. The elements of trenches connecting shell-holes cannot be clearly discerned by the aviators, nor taken as targets by the artillery; they may even be hidden from the infantry, and, especially when on a reverse slope, they may constitute formidable obstacles.

The machine guns which have been previously installed in the communicating and support trenches, as well as at all important points, so as to command the points of obligatory passages at an angle or in enfilade, come suddenly into action at the moment when the target they are awaiting can be most advantageously fired upon; they inflict upon the enemy in a short space of time enormous losses, whose effect is as great on the moral as on the material side. A single machine gun, which has remained unharmed in a casemated shelter, can often perform the greatest services if it is served by a brave and active crew; it can stop important forces in their advance, until the moment when the infantry is able once more to resume the struggle.

The defending troops try to impede the advance of the assailants by means of counter-attacks. These counter-

attacks are delivered by fresh troops. They are thrown forward at the moment when the enemy is exhausted by his effort and tries to recover his breath or hesitates in his advance. They can be delivered advantageously at night in case the troops employed are well acquainted with the position. The choice of the moment, which is of great importance for the success of these counter-attacks, is left to the judgment of the leader who orders them to be delivered.

Counter-attacks, instead of being local, may be launched from a neighboring position which is stronger or less severely attacked, and may free the position menaced by demoralizing the enemy.

In any case, one of the important factors of success is the mutual support which all the troops in line give one another. This support is easiest to effect when information as to the situation is most expeditiously transmitted and when all the different liaisons are best maintained.

CHAPTER IV

RETREAT

The retreat consists in abandoning, by order of the Command, either a part of the position, or the whole of it. It includes the evacuation both of men and of the matériel.

It is usually rendered necessary by a reverse suffered in the position itself or in a neighboring position, and is performed with the intention of retaking the evacuated terrain as soon as possible.

Re-alignment of the front is the operation of retreat performed voluntarily over a certain part of the line, in order to preserve the liaison with troops which have suffered a check, or to improve a dangerous tactical situation. It constitutes the means either of reëstablishing an enfeebled resistance, or of avoiding a probable reverse.

When the line has been driven back over a large zone, the army which has been thus broken permits the enemy to have complete freedom of movement, if it does not succeed in reorganizing itself in the rear. It is therefore necessary that the troops occupying the zones adjacent to that which has given way should try to re-align themselves with it. These troops fall back upon positions previously organized, which form the outline of the new barrier opposed to the enemy's efforts.

Similarly, when, for whatever reason, certain elements of the line have been obliged to fall back, the neighboring elements become salients dangerously exposed to the enemy's attack. If the Command considers that the defense of these

salients involves useless sacrifices, it orders them to be evacuated.

The re-alignment of the front which has been thus necessitated by a general or a local situation should be effected without the knowledge of the enemy. Prepared quickly but carefully, it is performed at night, and every precaution is taken to see that no feature of it arouses suspicion in the opposite trench. It becomes a very much more delicate affair if hampered by a sudden attack, or by an intense bombardment.

The difficulties of this operation consist especially in the evacuation of the artillery. If the artillery is removed gradually, the enemy, noticing the progressive diminution in the activity of the fire, may decide on a sudden attack, and find the infantry, so to speak, without means of defense; in such cases the infantry is crushed. If the artillery is not removed till the last moment, there results a congestion along the roads, and there follows a critical moment during which a sudden attack by a watchful enemy may cause disaster; the artillery in deplacement is captured, and the infantry is forced to seek safety in hasty flight.

When the re-alignment of the front can be performed unobserved, it permits of traps being laid for the enemy. The commonest of these consists in leaving in the evacuated position a thin advance-line of lightly equipped riflemen and alert engineers, whose task is to divert the enemy's attention. As soon as a hostile attack on it seems about to begin, the riflemen rapidly evacuate the position, so as to leave the coast clear for a carefully-prepared artillery-fire. The engineers increase the losses caused by the artillerymen by exploding, at the proper moment, previously prepared mines and fougades.

The enemy thus pays very high for his advance, without causing the defenders any injury.

Retreat under hostile pressure is the operation performed as the result of a direct reverse, in order to continue in a new position a resistance which for the time being has become impossible.

The Command is the sole judge of the circumstances and of the moment when a retreat is necessary. No leader of a unit should abandon on his own initiative the terrain which he is given to hold; he defends it to the last, informs his superior officers of his difficulties, and lets himself be killed on the spot with all his men if he does not receive the order to retire. Such a sacrifice is at times indispensable to the safety of larger units; for the premature retreat of one element of the line may seriously endanger the security of the others.

When the Command considers a retreat necessary, it sees to it that its orders reach all the units in proper time. In the midst of violent fighting communications become very difficult; telephone wires are cut, liaison agents are killed or wounded during their journeys, signalling is impossible. Taking all these contingencies into consideration, the Command determines the time and the conditions of the retreat in such a way that the most advanced elements can be notified; it makes sure that these elements are thoroughly prepared to fall back, and that no one is forgotten, by verifying the acknowledgments of orders received. Order and method are worth more than haste and impulsiveness in critical situations of this sort.

The retreat is performed whenever possible by night, so as to avoid the murderous fire which in daytime is opened upon troops in movement.

In every case it is indispensable for the units to have perfectly definite directions in which to march, and well-determined tasks to perform. "Beating a retreat" is not an aim; it is a means of escaping from the enemy in order to resist him successfully in another position. The itineraries are chosen so as to avoid crossing, crowding, and delays; the roads are reserved, in principle at least, for the artillery and the matériel.

The evacuation of the artillery is a delicate operation. The artillery is very useful up to the last moment to protect the retreat of the troops; but it runs the risk of capture if it delays too long in the position. The heavy pieces whose removal is difficult leave first and are followed by the field-pieces. The orders relative to their departure are issued by the Command, which, however, should be careful to leave a certain latitude to the commanders of the artillery units, since they are the only persons capable of estimating the situation as it actually is. Rapidity of comprehension, coolness, and method on the part of these commanders of units play a large part in the proper carrying out of the evacuation. If the pieces are irretrievably lost, they are disabled at the last moment.

The retreat of the various troops, including the first-line artillery, is carried out under the protection of the batteries remaining in position, whose barrage fire is directed upon the points by which the enemy must necessarily pass. It is also protected by machine guns and automatic rifles, whose skillful use can be of the greatest service.

The units of the rear guard have a difficult and dangerous task; since they are entrusted with holding certain points for a definite length of time, they are sometimes obliged to sacrifice themselves entirely in the performance of their duty.

Mutual support of the troops in line or in echelons, as well as maintenance of liaisons both lateral or in depth, are of great help in preserving order and security.

Mines and fougades prepared by the engineers, obstacles piled up at points where the enemy has to pass, retard the march of the hostile forces. The communication routes are destroyed as completely as possible, so as to impede the movements of the hostile artillery, the arrival of munitions and supplies, and to hamper liaisons on the ground. But counter-attacks, ordered at the precise moment when the spirit of the assailants begins to weaken, are the best of all methods of stopping the pursuit.

A resistance maintained step by step, contesting every inch of ground with the enemy, is not always the best method of attaining the desired result. It is often a better plan to escape from the enemy's clutches by a sudden rapid retreat, and at the same time to hold him back by artillery fire, and at night by a curtain of troops; and then finally to reorganize in a position against which he will hurl himself in vain, suffering losses which will be the greater in proportion as he fancies himself certain to succeed.

CHAPTER V

RETOUR OFFENSIF

The retour offensif aims at retaking the lost position.

It is carried out as soon as possible after the retreat, so as not to give the adversary time to consolidate his conquest. As soon as the enemy's troops, overjoyed by their initial success, encounter the next position defended, they often attack it in a haste and fury, inconsistent with proper preparation and suitable security; they suffer heavy losses and renew their attacks until they are exhausted. This is often the most favorable moment to attempt a *retour offensif.*

Fresh troops, who either know the abandoned position or who are supplied with numerous guides, are thrown against the decimated, disorganized, and discouraged assailants. They execute their attack in the same way as an ordinary attack on a position, but they also have several advantages: the defenses are neither as numerous nor as strong; the defenders have used up their troops, their reserves, and their munitions; they have not always got the range for their heavy artillery; and, lastly, they are demoralized by the attack of an enemy whom they imagined to be defeated.

The *retour offensif* may be aided by local counter-attacks delivered by adjacent troops, or by strategic counter-attacks carried out on other parts of the front, in order to draw thither the enemy's reserves or to keep in place such as are there.

Its success, since it increases the attrition and the disorganization of the enemy, may be the prelude to a victorious offensive.

CONCLUSION

The principles laid down in this study have been deduced from the actual events of the war. From the outset, a certain number of them have forced themselves upon the minds of many officers.

The synthesis which we have made is founded upon the personal observation of daily occurrences, from which the logical conclusions have been drawn.[1]

The exposition does, however, draw upon the imagination, since it describes phases of the present war which have not yet occurred.

But this imagination does not contemplate a "war of movement" wherein the enemy will have kindly removed from the territory in his rear all wire entanglements, all trenches, and all organized positions, so as to let the cavalry go prancing gaily through! It seeks merely to see the fighting as it must logically develop, in the present state of armaments.

The events of Verdun and on the Somme are a striking exemplification of the principles laid down in the chapters on the defense of a position, and on the preparation and execution of an attack. It is to be hoped, for the glory of the Allied arms, that some future day will witness the actual realization of such phases as "the pursuit" and "the march of

[1] The writer's first draft of the present work, *La Guerre actuelle, Réflexions et Souvenirs*, of which copies were deposited in the Archives of the Ministry of War at Paris, and at the Bibliothèque Nationale, March 2, 1916, is based on his personal experiences.

approach," and that the enemy will be forced to " re-align his front " and to " retreat."

It is impossible to summarize in a few pages a study which enters into the details of fighting, and which defines the parts played at each moment by the various arms. But it is permissible to emphasize a few underlying principles, whose very simplicity often causes them to be overlooked even by the best-informed minds.

Modern warfare is dominated by two factors: the offensive power of artillery, and the defensive power of field works.

These two factors determine its characteristics; it is "a war of positions."[1] Movement is in nowise excluded; but it is limited for a twofold reason: the encountering of organized positions and the difficulty of transporting and emplacing heavy artillery.

An attack which is well prepared and then carried out with the help of a large quantity of heavy artillery, abundantly provided with ammunition, has the best chances of success. In fact it should always result in the capture of the first trenches without great difficulty. The better the preparation, the less the assailant suffers. The result of the attack is a forward movement. The rapidity and width of this movement are proportional to the ease with which the heavy artillery can be deplaced.

Heavy artillery, indeed, has at its mercy those positions which it first subjects to a bombardment and then delivers

[1] Certain military critics, who have heard this expression without understanding it, speak of a war of position (in the singular), conceiving it as a war of stationary forces, as " trench warfare " (in the sense of warfare in holes in the ground), and contrast it with an imaginary war of movement!

over to the assaults of an energetic infantry. The second position is often stronger than the first; it is selected to suit the needs of the defender, whereas the first position has been forced upon him by circumstances. But the positions behind, whatever may be their tactical advantages, cannot be organized as completely as the two first, owing to lack of means, of time, and of men.

The methodical advance of the attacking troops causes them thus to encounter positions which become progressively less organized and more widely separated. The advance, for that reason alone, becomes more extended. But it would be folly to expect, on the part of an intelligent adversary, a sudden absence of organized positions. Any body of troops, when it has to fight, digs itself in and thus creates a position.

The enemy's defense also diminishes progressively in intensity, owing to attrition in men, which leads either to a shortening or to a withdrawal of the fronts; in matériel, which results in a weakened resistance in the fighting zones; in morale, which causes enemy troops to run away or to surrender.

Attrition of the adversary is the more intense when obtained by a more abundant and powerful matériel. Modern war, which is a war of positions, is, therefore, also a war of attrition and a war of matériel.

The object which should be aimed at is not only to have more and better troops than the enemy's, but also to have cannon and munitions in line when he is deprived of them.

Even should the adversary possess unlimited reserves in men, he is beaten if he has not sufficient artillery to protect them. Men are not a defense against cannon.

This principle is as true in the offensive as in the defensive. An obstacle is not overcome by repeated infantry attacks, but by successive blows dealt by the artillery.

The battle thus joined between cannon and field works has caused the artillery to become more and more powerful, and the trenches to become deeper and deeper. The logical outcome must be: on the one hand the construction of pieces discharging very heavy and highly explosive projectiles; on the other hand the digging of trenches and shelters, ever deeper, more casemated, and better protected.

The respective development of these two opposing factors may give to modern warfare varying aspects, according to the engines of destruction devised and the means of protection employed. It does not modify the general principles. But at any instant the cannon must be prepared for a strengthening of the opposing entrenchments, and the entrenchments must in turn be ready for an increased weight of enemy's cannon, if either side would avoid finding itself at a serious disadvantage.

There are, however, certain limits to this double development. Heavy artillery loses in mobility what it gains in power; it becomes too difficult to move, and, above all, to keep supplied. Deep entrenchments are dangerous because men or munitions may be buried in them; their construction, moreover, takes too much time and effort to be effected over large spaces of territory.

Because of the considerable man-power and the immense material means required in modern warfare, it is difficult to join battle along an entire front. Attacks are executed in certain zones, which may be very large, but are limited in number.

It is the choice, first of all, of these different zones, and next of that particular one where the fighting must be forced, regardless of cost, which constitutes the strategic art of to-day. Success will follow of itself.

The same law controls tactical and strategic efforts. In an attack upon a position, a centre of resistance falls if its flanks are overrun; in an attack on a zone, the position is doomed if its communications are exposed by the capture of the adjacent zones. Likewise, in an attack upon a front, an advance in one or more zones may lead to the evacuation of all the others.

If an army could dispose of sufficient munitions to begin and to continue an artillery action over the entire front, it would bring about ideal conditions for obtaining a decisive victory. The enemy's army, kept on the alert at all points, decimated, and demoralized, would be forced back in the zone where the attack was most successfully developed. The breach thus made would be deepened and widened, forcing the enemy to retreat in the adjoining zones.

The opening of the breach is but the prelude of success, for it requires cruel sacrifices of men and an enormous expenditure of matériel. It is the drawing in of the other parts of the enemy's front which completes the victory; this takes place over a considerable extent of terrain and permits an assailant who is watchful and active to capture thousands of men and of engines of war, almost without striking a blow.

Attention and activity must be the watchword everywhere. No troops, even in the calmest sector, should allow themselves to become slack or idle. If they do, they may well permit the enemy to escape unperceived, and thus lose all the advantages of a success which has been within their grasp.

CONCLUSION

Upon every point of the front the soldiers should labor unremittingly to prepare for the glorious morrow. It is the duty of every commander to organize his position or his trench for the offensive as well as for the defensive; he must not spare himself trouble nor quiet himself with the false excuse that he occupies a merely provisional position. Unceasing labor always bears fruit.

Will-power, method, discipline, and perseverance are the means by which Victory is won.

GLOSSARY

GLOSSARY

Accessory Defenses (*Défenses accessoires*): Material obstacles such as barbed-wire entanglements, chevaux de frise, pitfalls, etc., for the purpose of obstructing the approach to temporary or permanent fortifications.

Aménagement (*Aménagement*): Preparation of a terrain or of a position for the purpose of a military operation. It includes the construction of all sorts of works, the bringing up and installation of matériel, the organization of communications, etc.

Artillery:

(*a*) **Field Artillery** (*Artillerie de Campagne — A. C.*): In this book this term is used in its French sense. In France field artillery includes only the smaller calibres such as the 75 (3-inch), the 80 (3.2-inch) and the 90 (3.6-inch), which correspond to what is called " light artillery " in the United States. The larger calibres, including the 95 (3.8-inch) and upwards, are classed in France with the heavy artillery; but in the United States some of these larger calibres are included, together with the light artillery, in the term " field artillery."

(*b*) **Heavy Artillery** (*Artillerie lourde — A. L.*): In this book this term has also been used in its French sense. In France heavy artillery includes the 95 (3.8-inch) and upwards; it is subdivided into heavy artillery of medium calibre (up to the 155 (6-inch)), and heavy artillery of larger calibre (from the 155 upwards).

(*c*) **Light Artillery** (in the U. S.) (*Artillerie légère*): This term no longer exists in France, and it is not used in this book. The American light artillery is the same as the French field artillery. (See under " Field Artillery.")

(*d*) **Trench Artillery** (*Artillerie de Tranchée —A. T.*): Includes all ballistic weapons, bomb-throwers and mortars of all calibres and of all models which are set up in trenches and served by artillerists called trench mortar-men.

Attrition (*Usure*): Indicating wastage of men and of matériel, and deterioration of morale.

Barrage (*Barrage*): Prevention of passage across a zone by means of projectiles from artillery or infantry weapons such as, e. g., rifle-grenades.

Boyau (*Boyau*): A ditch used for communication between the trenches and the rear in the dangerous zone. The boyaux run in a direction generally perpendicular to the front, and are used solely for communication, while trenches are used for combat and run in a direction generally parallel to the front. The English call these boyaux " communication trenches," which is likely to cause confusion. The word *boyau* is in accord with the French usage. To avoid errors which might result from the adoption of the English terminology, the term " communication trenches " has been kept out of this book. The terms " communicating," " doubling " or " transversal trenches " are employed to designate trenches which run parallel to the front and are used for lateral communication.

Camouflage (*Camouflage*): Any means of concealment of works, batteries, matériel, roads, trenches, troops, or any other implement of warfare.

Command (*Commandement*): Designates in a general way leaders of high rank whose duty it is to make decisions and to give orders; it also includes their staffs.

High Command (*Haut Commandement*): Designates leaders of the highest rank such as the Commander-in-Chief, Generals of army groups and of armies.

Command-Post (*Poste de Commandement*): Place where a commander places himself, either in the trenches (organized shelter) or during the course of the combat (improvised shelter). In current usage the word " station " is sometimes employed, together with the rank of the commander occupying it: e. g., " Colonel's station."

Counter-Attack (*Contre-attaque*): Partial attack directed against an attacking body of hostile troops for the purpose of preventing its advance.

Depôt (*Depôt*): Place where provisions, water, ammunition or matériel can be set down. In zones exposed to artillery fire it is a shelter or a wide space where munitions are spread out so as to escape the danger of destruction by enemy airplanes.

In the French military vocabulary the word has another meaning, namely, the unit comprising available troops who are awaiting their departure for the front, as, e. g., *depôts des regiments* (in the cities far behind the lines) or *depôt divisionnaire* (near the front).

Echelon, *verb* (*Échelonner*): To arrange a body of troops in echelons, that is to say, to divide it into two or more portions placed one behind the other.

Echelon, *noun* (*Échelon*)

1. A portion of a body of troops arranged in echelons. In the case of artillery, " to move by echelons " means to move the echeloned portions one after another in such a way that the rearmost passes in front of the foremost.
2. In a special sense a portion stationed behind and to the right (or left) of another portion of the same body of troops. This special sense is the one adopted as the general meaning of the word by the British army. " To retreat by echelons " means, in the case of infantry, to move back the different portions one after another in such a way that one of them is placed behind and to the right (or left) of the one adjacent to it and under its protection.
3. In French the word *échelon* has also several other meanings:
   (*a*) *Échelon de Combat* (artillery) signifies combat train;
   (*b*) *Échelon*, in the case of a machine-gun company, designates a portion of that company consisting of the means of transport for those guns and their ammunition which are to go directly to the firing line.

Echelonment (*Échelonnement*): Arrangement by which a body of troops is divided into echelons.

Effectives (*Effectif*): Number of men (officers, N. C. Os., and soldiers) in a body of troops.

Emplacement (*Emplacement*): Point or portion of the ground which is or can be utilized to install a weapon, an implement, an organ of command, matériel, or a body of troops. The "location" is the topographical determination of the emplacement.

Enfilading Fire (*Tir d'enfilade*): A fire which catches a linear objective longitudinally, whether from the side or from the front; end-on fire.

Fascines (*Fascines*): Faggots about eight feet long used in field fortifications.

Field Works (*Ouvrages de campagne*): In contrast to permanent fortifications.

Flanking Fire (*Tir d'écharpe*): Oblique or slanting fire.

Fougade (*Fougasse*): Buried charges of powder or melinite sometimes covered over with stones and exploded by an electric current or by a detonating fuse.

French Automatic Rifle (*Fusil mitrailleur*): An automatic rifle which works by a long recoil of the barrel and is loaded with semi-circular clips containing twenty cartridges each. It weighs about eighteen pounds and is served by a marksman and two loaders.

Gabion (*Gabion*): Cylindrical basket without a bottom, composed of branches tied around stakes; utilized in field fortifications.

Group (*Groupement, — d'artillerie*): The word *groupe* in French designates the regular artillery unit corresponding to the American artillery battalion. The group (*groupement*) on the other hand is a temporary conjunction of different units — usually of different calibres — as for example a battalion of field artillery and a battery of heavy artillery.

Indicative (*Indicatif, — aviation*): Prearranged signal by means of which an airplane or balloon can either call the station on the ground with which it wishes to communicate (by wireless or by a projector on board) or can make itself known by an identifying cartridge with one or several flashes.

Listening Post (*Poste d'écoute*): Post situated in front of the first line trench for observing and listening to the movements of the enemy.

Observation Post (*Poste d'observation*): Position selected to enable commanders of every rank to observe the enemy or the terrain. It should be close to the command-post and consequently determines the choice of the latter in the case of an advance; it is organized as completely as possible.

Observing Station (*Observatoire*): A construction specially organized for purposes of observation in a place selected because of its topographical location and the views it commands. Observing stations are provided with a special personnel and a special outfit; they are carefully concealed from the sight of the enemy and protected against bombardments. There are observing stations for the Command and observing stations for the artillery.

The French word *observatoire* is also applied to airplanes and balloons. One speaks of aërial *observatoires* in contrast to those on the ground.

Projector (*Projecteur*): A machine for throwing beams of light either to illuminate a zone at night time (as for example in front of the trenches) or for correspondence by visual signals on the ground or in the air.

Retour Offensif (*Retour Offensif*): An attack whose object is to retake a trench, a work, a terrain or a position which the enemy has seized.

Rifle Grenade (*Grenade à fusil*, e. g., *obus V. B.*, q. v.): A grenade of cylindrical shape fired by means of a sort of cannon (called in French *tromblon*) which can be fitted to an ordinary rifle. The shell is propelled by the powder in the rifle cartridge; it explodes from five to seven seconds later, through the action of a firing powder which is lighted by a trigger set off by the bullet of the rifle.

Sap (*Sape*): An excavation which may be subterraneous or not dug by men who advance foot by foot; in contrast to a trench or a boyau which is made by men all digging at the same time.

Sapper (*Sapeur*): Soldier of the engineers; in a special sense one who digs a sap.

Stationary Fighting (*Stationnement*): A period of the war of positions during which the troops remain in the same trenches and are unable to advance.

Traverse (*Traverse*): A piece of natural soil around which the trench turns, and so placed as to protect adjacent portions of it.

V. B. (**Viven-Bessières**): Names of the inventors of the V. B. rifle grenade used in the French army. (See under "Rifle Grenade.")

Zone (*Zône*): Space of terrain of variable size.

(*a*) **A zone of the front** might be as much as fifty miles long and twenty deep. Such a zone may be defined by limits existing in either of the adversaries' lines.

(*b*) **A zone of attack, of march, or of stationary fighting** is the portion of territory, of limited extent, which is assigned to a large or small body of troops, in any phase of the combat (attack, pursuit, march of approach, or stationary fighting).

(*c*) **Zone fire** is an artillery fire directed on a limited space which constitutes the target, without designation of any more special objective inside it.

PRINTED AT
THE HARVARD UNIVERSITY PRESS
CAMBRIDGE, MASS., U. S. A.

LIBRARY OF CONGRESS
0 011 572 997 4